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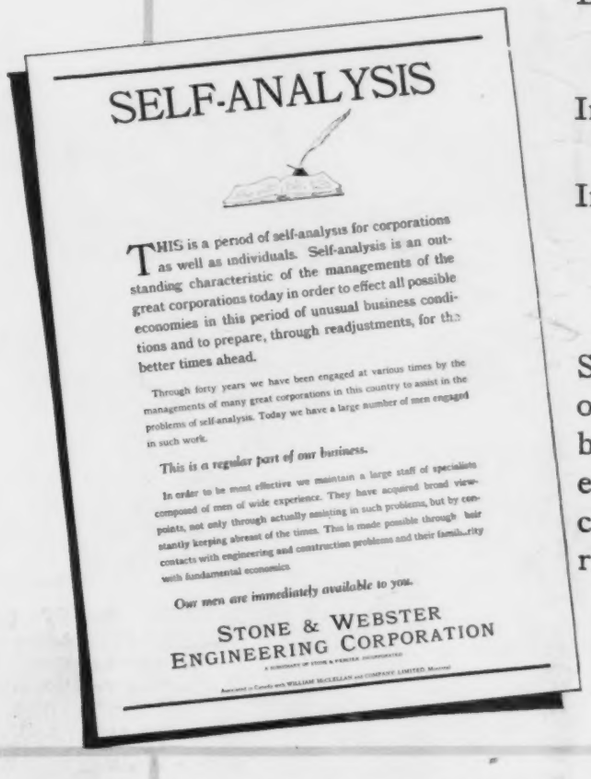
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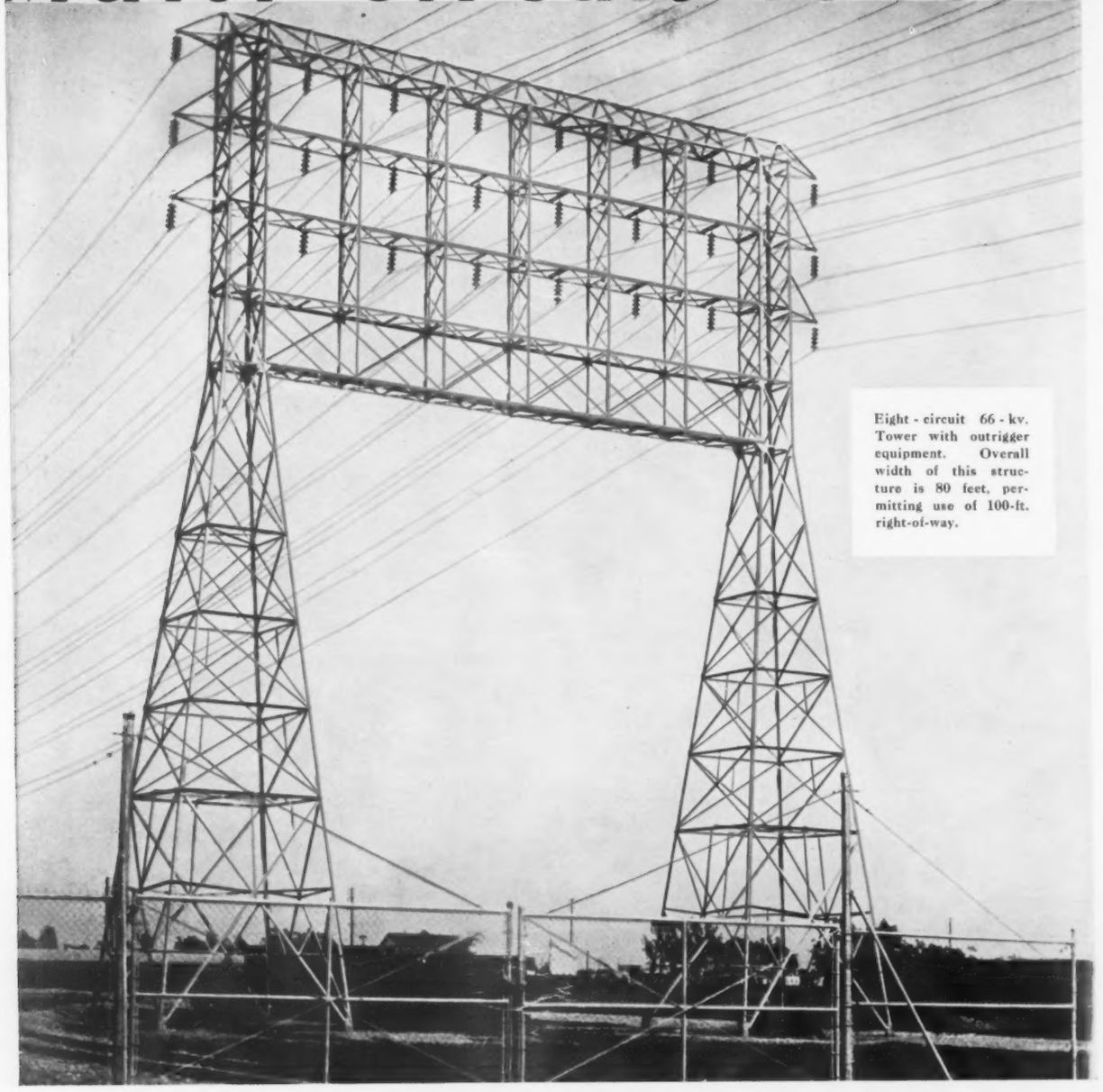

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Contents

The Month 213

Editorial 214

The Industry—

Proposing an Electrical Utilization Research Foundation 216

Construction—

What We Learned From the Bullock Job 218
By R. E. LLOYD

Some New Wrinkles in Electric Heating 221

Today's Stage Spectacles Require Modern Facilities 222
By HAROLD GERBER

San Diego Breaks Red Seal Quotas 224

Combines Installation With Special Manufacture 225

Industrial—

Modernizing the Motor Specialist 226

Winding Calculations Reduced to Single Slide-Rule Setting 228
By W. O. HURLBUT

Engineering—

Transmission Practice in the Northwest 232

Commercial—

Let's Promote Christmas This Year 240

Comparing Electric and Other School Heating Methods 244
By PROF. H. WARD AUSTIN

A Quarter a Day Keeps the Iceman Away 246

Taking the Terror out of Time Payments 247

News 248

Meetings 256

Personals 257

Contractor, Dealer, Inspector 258

Manufacturer, Distributor 261

New Products 263

Barometer 266

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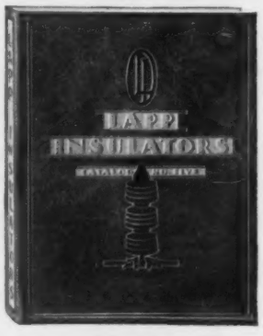

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G. C. TENNEY, *Editor*

Editorial

In Memoriam — Thomas Alva Edison

EDISON—a name known to the far corners of the earth, a common word in every language. Edison—translated into a universal tongue—light. Few civilized lips but what have spoken his name, few lives but what have felt the beneficent influence of his handiwork. Snuffed out is the spark that animated his physical genius, yet burning ever more brightly is the light that made him humanity's greatest benefactor.

The world can never sufficiently mourn his passing. The contributions of his genius will remain forever indelibly engraved upon the pages of the life of mankind. Through him the human voice became immortal; pictures took life and moved; darkness dissolved at the touch of a finger; space became the carrier of entertainment.

The pages of history reveal no other man who so revolutionized the life of the world within the allotted span of his years. Electric light, the telephone, the phonograph, motion pictures, to choose but a few of the thousand odd inventions that bear his name, any one of these would bring fame to any man. Who of us can picture today a world without them? What satisfaction it must have been to Edison to have perfected these things and then witnessed human enjoyment of them.

He lived to see the fruits of his genius provide work for one man in ten; to give employment to whole industries whose investment and output exceed the value of the world's gold.

With Edison invention was organized work. He recognized a human need and set his brain to the task of meeting it. He translated the dreams, the theories of pure scientists into practical, everyday working tools available for all men. To the thoroughness of his methods the electrical industry can testify. Not only did he perfect the electric lamp but he developed a complicated system of generation, distribution and measurement which made its universal application possible. In giving to humanity the comforts and conveniences of electricity alone, he won for himself world-wide recognition as a public servant.

Yet great as have been his material contributions to human welfare, there is another side to the life of Edison. His human qualities have endeared him to his fellowmen. His modesty, his encouragement of youth, his philosophy of living, his courage in the face of obstacles —these mark him as a great man as well as a great inventor. Edison, too, justifies more than any one man the ideals of Americanism. From the humblest beginning he rose by his own initiative to the pinnacle of world citizen.

Thomas Alva Edison belongs to no generation—he is of the ages. His genius has brought comfort, convenience, happiness and pleasure to past and present generations, will bring more to those to come. As long as man survives the name of Edison will stand for public service. Of Edison the world may always say, "If you would see his monument, look around."

"Merchandising" Is Not A Good Word for Utilities

"MERCHANDISE profit," "merchandise manager," and "merchandise sales" are phrases which should be eliminated from power company vocabularies. Merely connecting the words *power company* and *merchandising* in discussing electrical appliance sales with some retail merchants, produces the same effect as inadvertently displaying a red shirt in front of a mad bull. The onus is all on the word *merchandising.*

Irrespective of the merits of either side of the power company-dealer controversy, too much prominence has been given to merchandising by the utilities. Many companies have considered merchandise volume and merchandise profit of more importance than load-building. Dealers are loud in their condemnation of these companies and support their position with published statements from utility men. At the doorsteps of such companies may be laid a large portion of the blame for the present strained relations. Under these circumstances it is difficult for commercial managers to convince dealers that the power companies' chief interest in appliance sales is in the load that is added to the lines.

One way to allay, at least partially, the present intolerable situation, is to drop the word *merchandise* in all its forms from the power company vocabulary. When dealers can be convinced that utilities are sincerely interested in load-building, then there is hope for the success of the various cooperative programs that are being developed.

Range Wiring Policies Are Rapidly Changing

ELECTRIC range wiring without cost to the customer is arousing more and more interest among Pacific Coast power companies. Three utilities have adopted the policy, others are giving it serious thought.

Two methods of accounting are employed in handling the added expense. One, using a "portable" installation which may be removed from the premises in the same manner as a meter, capitalizes the wiring cost. In the other case the cost of the wiring is added to sales expense. Each policy has its advocates.

In both cases the wiring is given with ranges sold by dealers, the utility absorbing the cost. Advantages of this plan are many: The range market is extended to a large group of homes; a major sales resistance is removed; dealers not otherwise interested in range selling become active; normal load growth is greatly stimulated.

Principal objection comes from contractors who do not feel kindly toward the wide advertising of "free wiring" and who are fearful of what this policy may lead to in the future. Troublesome problems are liable to develop in the case of newly constructed homes whose owners might demand free range wiring, charging discrimination if their request is not met. None of these obstacles is insurmountable.

Any plan which will increase range sales and range load and at the same time encourage dealer cooperation is justified. Judging from experience to date, the industry may expect more Western power companies to adopt the policy of giving the wiring with the range.

An Electrical Women's Club

WOMEN'S committees have become a regular division of association activities. These committees, though limited because the numbers of women employees are yet a small proportion of the total, have performed notable work. In some smaller companies, in order to have a women's committee at all, the wives and women relatives of all employees have been included in the membership.

Now a large company, the Los Angeles Gas and Electric Corporation, has decided that the idea is one of merit. Recently a women's club of wives, daughters, mothers, and sisters of the company's employees was formed. It is to have all the advantages of any civic club. It will study civics, community property laws, industrial relations, child labor laws, and any other laws affecting women and their homes. It will study home management, in its various phases of budgets, decoration, diet, food preparation, appliance use, and other similar topics.

Women's committees have necessarily had limited scope as long as their activities were confined to company interests alone. How much greater influence can they exert for better homes and living if they become the leaders for the larger body of women, the women folk of all the employees of the company. Here is a task, an opportunity worthy of their highest efforts.

Public Relations— For a Consideration

FROM the customer-ownership committee of the National Electric Light Association comes the highly significant information that 1930 evinced no indication of a depression relative to the customer-ownership activities of electric utilities. During that year, when the turmoil of security markets was characterized by distinctly bearish tendencies, 1,671,616 shares of stock were sold to 115,013 stockholders, representing a 15 per cent increase in volume of sales and a 31 per cent increase in the number of purchasers over 1929.

From the ratio of shares per sale, the trend is evident that the small investor is taking refuge in the sustained earning capacity of his electric company. His action bespeaks the public's confidence in the sound management of the utilities, confidence which so far has been more than justified by its recipients—wherein lies a moral.

Public relations, public confidence and public interest never can be purchased, but there is no denying that recognized financial integrity makes for ready community appreciation of corporation activities. Utilities can well take advantage of their operating reports to increase customer ownership within this multitude of such investors.

The public, in placing its confidence and its funds in the hands of utility management, expects only intelligent consideration of the small investors' equity—after all a truly nominal recompense for a foundation of increased good will and an appreciative understanding of public utility problems.

A New Kind of Airmindedness

OUT of this dry, hot season's "unusualness," out of the comfort brought about by refrigeration, too, has come a decided interest on the part of the electrical industry in air. The airplane, the radio—perhaps they have contributed to this new airmindedness. More than likely it has been a growing realization, first on the part of certain industries, then commercial establishments, and soon it will spread to the home, that the air in which work is done, or life is lived, is as important a factor as the other materials involved in producing or just living.

Critical chemical processes, scientific preparation of foodstuffs, the need for comfortable coolness in public buildings where large numbers of people congregate—all these demand air conditioning. Refrigeration for cooling and reverse refrigeration for heating have suddenly opened up a new field of electric service into which the entire subject of ventilation is inextricably woven. The next step will be the reduction of unit sizes to accommodate such systems to residential uses. It took many years to bring refrigeration down in scale to fit it into the kitchen, but the phenomenal acceptance of the idea has more than repaid the attempt. It should not take so long to discover the domestic air conditioning possibilities.

Gradually electricity, itself so controllable, is bringing under control of man all of the forces of nature which hitherto he has had to accept as he he found them. Man has brought the sun into his home; now he will bring in his own preferred brand of weather as well.

The Answer to Practical Utilization Research

ELECTRICAL WEST'S proposal that light and power companies of the Pacific Coast undertake research in the field of electrical utilization takes definite form on another page of this issue. Drawing freely from comments and suggestions received, the editors present a practical program which will permit immediate action.

The original proposition that a research laboratory be established has been modified. The present suggestion is that a research foundation be established. This overcomes the objection that the program entails financial commitments impossible of attainment. Thus a modest beginning is possible. Questions of facilities and man power have been answered by the educational institutions which have generously offered their hearty cooperation. The belief that utilization research is unnecessary has been met with declarations by the commercial executives that there are many problems to be solved, many projects demanding immediate attention.

The program needs only action to bring it into being. ELECTRICAL WEST proposes that the presidents of the Pacific Coast Electrical Association and the Northwest Electric Light and Power Association appoint a committee representing the utilities and the universities to perfect the details. With a definite need for study of future markets, with facilities to make such studies and with reasonable financial support, the electrical industry may look to the future with confidence—a feeling lacking in other industries today because in years past they failed to heed the danger signals.

Proposing an

Electrical Utilization Research Foundation

SUGGESTED as a means of promoting load building through widening the application of electricity, endorsed both as to necessity and practicability by prominent educators, utility executives and manufacturers' representatives, an Electrical Utilization Research Foundation awaits only the inception of some comprehensive, workable program to become a dominant factor in insuring the future of the electrical industry. ELECTRICAL WEST believes that a plan of action molded around the following suggestions will expedite the consummation of this purpose.

Fundamental principles, conducive to the success of the project, and gleaned from the widespread comment on the proposal that a research laboratory be established have indicated that flexibility of application, administrative personnel and modest financial beginnings are paramount necessities. Consideration of these principles has resulted in a modification of the original idea for an electrical research laboratory whose ramifications would introduce problems militating against the wholehearted cooperation necessary to attain the maximum benefits from the new organization.

Studies of load building applications for electrical energy would encompass possibilities in the entire industrial, commercial, and domestic fields. Of necessity, widely divergent problems must be considered by any organization devoted to such studies,—problems which, by the very nature of their diversity, would tax the facilities of the best equipped laboratories. To be successful such an organization either should be equipped with apparatus capable of handling the diversified nature of its investigation or should have access to such equipment.

From the information at hand, the establishment of a foundation for electrical utilization research offers a means for accomplishing the study of these load building applications without many of the disadvantages inherent in a research laboratory. Flexibility is clearly apparent, capable operating personnel is assured in the faculties of our educational institutions, and large initial investments are eliminated through the use of existing laboratory facilities at these institutions.

Funds for the establishment of this foundation would be contributed by utilities in the eleven Western states in an amount commensurate with the original investigation to be undertaken by the organization. Contributions might be made on the basis of kilowatt-hour output or any other basis acceptable to the member companies. Such funds would be pooled in the treasury of the foundation. As research undertaken by the foundation might develop valuable information of a patentable nature, it is conceivable that the foundation eventually could become self-supporting if royalties on such patents were returned to the treasury. Patents of this nature then would be administered for the best interests of the industry as a whole.

Administration of the funds of the foundation would be in the hands of a committee consisting primarily of utility executives with representation from the educational and manufacturers' group. The administrative committee would control both the lines along which research is to be directed and the amount of endowment fund to be allowed for any given research problem. In this manner, those most familiar with utility problems would be authorized to direct activities of the foundation toward pertinent and timely controversial subjects in electrical application.

Fortunately the idea of an electrical research utilization foundation has won not only the approbation of Western educators, but their whole-hearted cooperation and support even to the extent of offering institutional facilities for the work. Thus two important requisites for the success of the organization would be provided.

Capable supervision of research studies would be available at these institutions and monetary outlay would be limited to the purchase of specialized apparatus and whatever costs might be incurred for expendable material and laboratory assistance. One highly desirable characteristic of this program is the ability to take the research to the man. As many educators emphasize, capable research men work at their highest efficiency when placed in surroundings of their choosing. In keeping with these requirements, the foundation would be able to take the problem under consideration to the most capable man available.

In cases where the investigation would require a technical assistant, it might prove advantageous to create a limited number of fellowships from the general fund. Selection of a capable recipient for a fellowship would

A workable program

based upon suggestions and comments received from executives, educators and manufacturers as published in the October issue is presented in this article. The plan involves features of several research foundations molded to fit the special conditions of the problem facing the electric utilities. It is, however, only a suggestion of how the problem might be worked out.

be made by the professor in charge of the work and the student might use the study as a basis for his thesis.

This flexibility is highly desirable, for individual problems could be studied at institutional laboratories most suited to the work. For many problems whose solutions involve climatic conditions, studies could be carried out in widely divergent territorial locations. Others involving the use of specialized equipment could be studied at institutions where such equipment is available.

In operation the foundation would require only the services of a full-time executive secretary to handle routine business matters and disseminate the results of research studies to the utilities. Meeting at regularly stated intervals, the administrative committee would review new problems which have been suggested and select those whose study is likely to bring maximum results to the industry. The problem would then be submitted to one or more educational institutions for determining the amount of money necessary to bring it to a conclusion. If, in the judgment of the administrative committee, the amount requested would be justified in benefits obtained from the study, the money would be advanced from the fund of the foundation.

Of primary importance in this suggested set-up for the foundation is the elimination of the heavy overhead involved in the maintenance of a highly-paid administrative and technical personnel and completely equipped laboratories. Activities could be directed very satisfactorily under the general supervision of the executive secretary. Compensation for research workers would be in the form of fellowships heretofore described.

Experience of research organizations which have been established by other industries, the activities of the Committee on the Relation of Electricity to Agriculture and the operating plan of similar foundations offer the opportunity of compiling a detailed outline of organization. Significant are the results which have been obtained from similar foundations, of which the most conspicuously successful, although originally endowed, have been self-supporting for some time and have contributed valuable data to their sponsors.

At the present time valuable suggestions, proffered to assist the building of load and meriting a thorough investigation, too often are discarded for the very reason which prompted this suggestion of an Electrical Utilization Research Foundation. The lack of facilities can no longer be used as a legitimate excuse for neglecting these problems in electrical application, some of which threaten to retard the progress of the electrification in certain lines of industry. Future advancement depends as much upon the development of new uses for electricity as it does upon the exploitation of present uses.

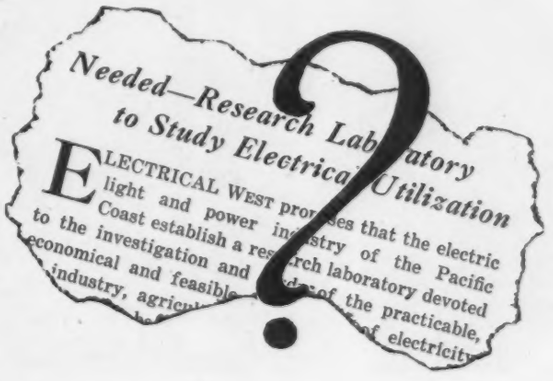
While load building itself presents possibilities of study which would justify any reasonable expenditure, other intangible but none the less permanent benefits are inherent in the operation of such a program. Lower prices reflected in decreased production costs through further electrification of industry and the development and use of convenient, leisure-multiplying domestic appliances, present possibilities for building good will as well as load. Closer cooperation between utilities and educational institutions, by means of the research fellowships, would foster engineering and research talent hitherto diverted to less beneficial occupations through the press of economic necessity.

Regarding the latter point, post-graduate studies of this nature will familiarize students, associated with the work of the foundation, with public utility problems. Many utilities already provide a training course in engineering for a selected group of technical graduates and the commercial aspect of utilization research presents the opportunity of training competent men for this important phase of electrical development.

Even with the most astute analysis of present conditions, no executive can predict with any degree of certainty what problems will face the industry in two or three decades. The plight of certain of our major industries today might have been averted if measures similar to the one herein proposed had been adopted during the optimistic prosperity of their earlier operations. In view of the indubitable benefits which could be made possible through utilization research, premium charges for this type of industrial insurance would be infinitesimal compared to the revenue gained therefrom. Research problems await solution, facilities for their investigation are available, the mechanics of a feasible plan of operation is outlined in this article and the inauguration of an Electrical Utilization Research Foundation requires only the support of a united electrical industry.

Such a program will

1. Permit of a modest beginning. Research may be undertaken to the extent of the funds available each year. The initial fund need not be large.
2. Utilize existing equipment and facilities to the utmost. This will permit research projects to be undertaken with a minimum expense.
3. Take the research to the man. This is a desirable feature as many commentators emphasized.
4. Provide supervision by a group of practical men who are best fitted to judge as to the fitness of the individual research projects.
5. Encourage maximum cooperation between the utilities and the educational institutions
6. Provide the greatest possible flexibility to the program.



What We Learned From the Bullock Job

Setting the Mode in Modernistic Lighting Practice, This Remarkable Store Building Still Is the Most Advanced of Its Kind and Offers a Model for Lighting of the Future

By R. E. LLOYD
Foulkes Electric Co., Los Angeles

BULLOCK'S department store on Wilshire Blvd., Los Angeles, has been so widely publicized that one might naturally wonder what more could be said about it. However, it has been discussed mainly from the artistic and architectural points of view; the matter of economy of installation and efficiency of operation for built-in or flush lighting units has been either ignored or overlooked.

A few locations in this building are lighted by indirect means; that is, by concealing the lighting units completely from view and using the ceiling to reflect and diffuse the light. But the majority of the lighting units are concealed behind panels of ground glass. These panels vary widely in shape, in size and in placement, but with few exceptions are set flush with the contiguous walls or ceilings.

The Foulkes Electric Co. did not learn anything that could properly be designated as new, but they did receive a positive and convincing demonstration, on a large scale, of certain principles of construction which as a rule are slighted somewhat by the architect, engineer, builder, and by the contractor himself. Ceiling outlets, for instance, can be shifted without great trouble or expense, and the lighting units themselves can be adapted to meet varying conditions without seriously affecting the efficiency. But not so with built-in lighting. In some cases the cost of installation is not materially increased when we are forced to shift reflectors from the ideal position to a position not so good, but the appearance and the efficiency—that is, the ratio between money spent for electric current and the actual foot-candles delivered to the working space—are lowered.

Therefore, in drawing the plans for built-in lighting, it behooves the engineer and architect to exercise much more than the usual care to avoid interference between lighting panels and ventilator ducts, drain pipes, water pipes, steam pipes, sprinkler pipes or large beams. These lighting panels are built into the suspended ceiling before the contractor can start the installation of the reflector units. Some of these panels are quite large and are in line with other panels, so that it is often quite impractical to move one, even if the expense is not a primary consideration. With ordinary outlet boxes placed in the suspended ceiling, it has never been necessary to give much attention to interference with the other trades, because the box requires very little space and can always be worked into the proper position some way or other.

In this built-in lighting, where a definite minimum depth is required to obtain the best results, the problem is much more difficult. Suppose we consider, as example, that the plans show a rectangular panel in the ceiling, with a clearance of 2 or 3 ft. between the suspended ceiling and the concrete slab above. The panels are to be made up of the highest grade sanded glass, imported at considerable expense so as to reduce the amount of glass absorption. Fine. Here is a chance to give some real lighting and keep the wattage down.

But . . . when the wiremen come to install the reflectors above this panel, they find a ventilator duct or a large beam above it which cuts down the clearance to such a small space that it is not at all practicable to place the lighting units directly above the glass. If they do place them directly above the glass they must use much smaller units, and many more of them. That will solve the efficiency part of the problem, but it will leave the beautiful glass panel with a series of spots and shadows which neither the owner nor the architect will accept.

The electrician is forced to shift his reflectors away from the ideal position and perhaps use eight reflectors for a panel that should require but six, and these must be set to one side and tilted at an angle that necessarily involves a loss due to the refraction and reflection of the glass. The glass itself may appear as bright to the eye, when viewed from the side, as another panel of glass which is properly lighted, but this effect

Green-capped tower of Bullock's Wilshire store floodlighted on the street side by special 5-unit lighting standards, and on each side by units on the setback lower roof. A blue Neon cap harmonizes with the verdigrised copper top

is due to the glow of the sanded side of the glass. If a photometer is placed under each panel the actual loss in efficiency can be easily detected.

Fig. 2 presents a diagrammatic view of a glass panel with sufficient headroom to place the reflectors at the proper distance to get an even spread of illumination and at the same time keep the angle of incidence acute enough to eliminate practically all loss except the loss due to glass absorption.

Fig. 3 shows what happens when the clearance is reduced so that the reflectors have to be placed at the sides of the panel. It is still possible to get the spread, although in many cases, on account of plumbing pipes of various sorts, it is necessary to increase the number of reflectors to do so; but the bad feature is the loss due to the refraction of the glass and the light reflected from the top surface of the glass. As already stated, viewed from a position at the side, these two panels may seem to be about the same in brilliance, but the loss is there nevertheless. Just another case where the eye deceives. When the reflectors are not properly placed the owner must stand for an increase in current consumption or be satisfied with less light than the original layout was planned for, and less than he paid for. A loss of efficiency is something that the owner pays for every month, every time he pays a light bill, as long as he uses the building. For that reason it is the duty of the contractor to check up carefully on buildings of this sort before it is too late. The architects and engineers are vitally interested in the economic proficiency of buildings as well as their structural stability and beauty of design. The better the architect the more pleased he will be to receive the cooperation of a competent lighting man.

Fig. 1—Light panels conform to the walls and ceiling in the lobby entrance. Shadows are used to add to the cubist effect. In the rear are seen the circular ceiling panels

Be not unduly alarmed at shadows. There are cases where they may be used to advantage. Lighting engineers usually strive to effect a smooth, even light on all flush panels, arriving at their ideal only when they have eliminated all shadows. In this installation the designers have made effective use of shadows on some of the larger light panels.

In Fig. 1 can be noted, upon close examination, faint horizontal lines on the wall lighting panels where the glass overlaps. There are also lighter shadows paralleling the vertical bars. They are difficult to get with a camera, without sacrificing the general detail, but they are plainly visible to the eye. All of these shadows blend perfectly with the general cubistic scheme of decoration and break the monotony of the large expanse of flat light. There was sufficient room behind the glass to obtain much more light than was needed and to eliminate all shadows, if desired, but a little experimentation proved that the deliberate use of these shadows enhanced the beauty of the whole panel.

In the same picture, looking through at the ceiling of the adjoining room, several flush, circular panels, about 6 ft. in diameter can be seen. From these panels, it was desired to obtain the maximum amount of light, but the small space above the ceiling would not permit the effective use of ordinary reflectors. This problem was

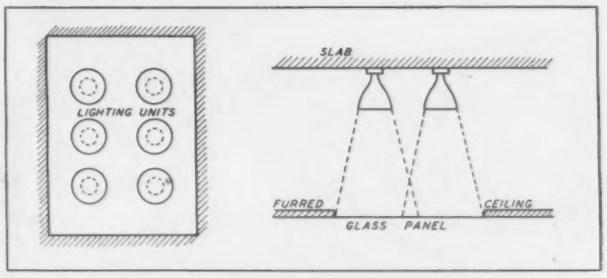
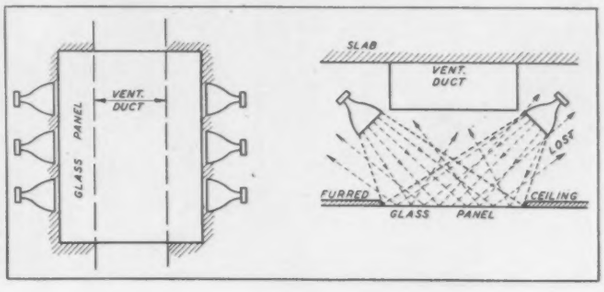
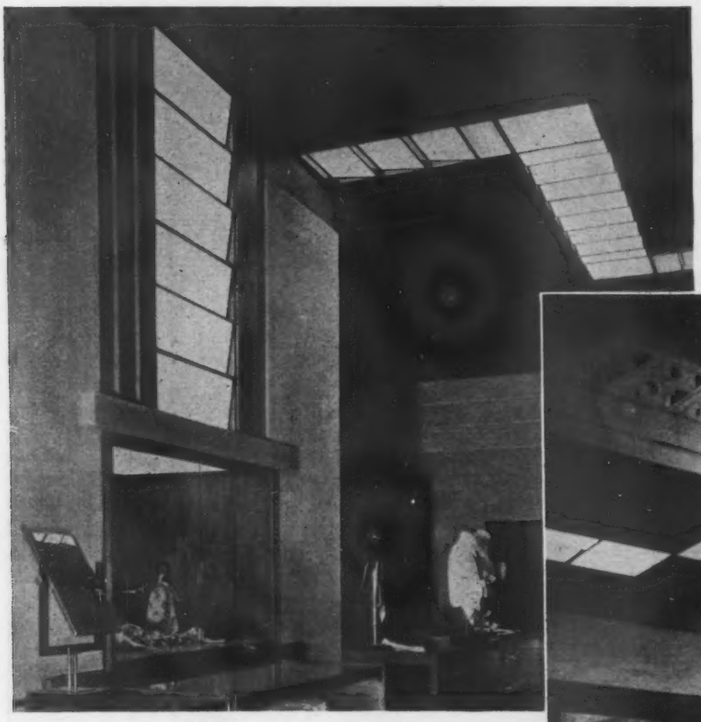


Fig. 2 (above)—Ideal mounting of reflectors to produce maximum illumination from lamps. Fig. 3 (below)—Ventilating ducts, pipes, etc., in the way force a side mounting of units with resulting reflected and lost light

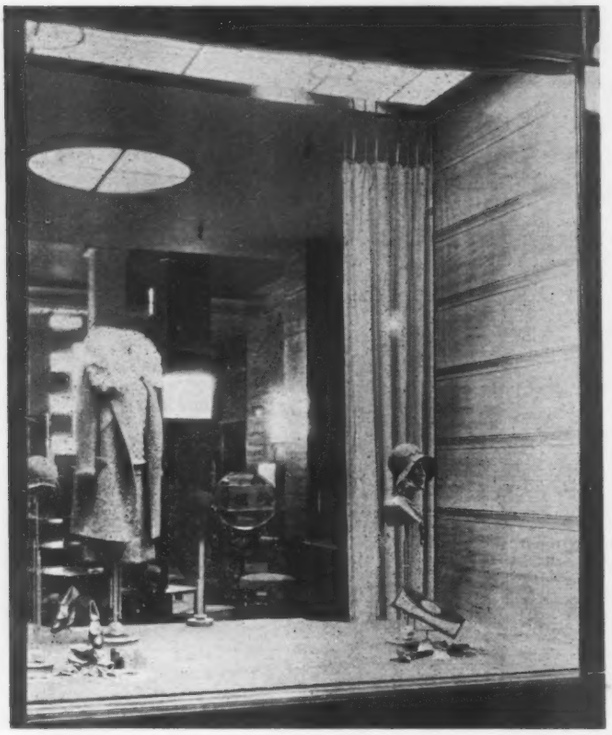




Left—Ceiling and wall lighting in which panels are set at a slight angle for decorative effect. Below it is one of many inset display windows throughout the store, lighted by a luminous ceiling panel

Below—A ceiling box projected from a dropped ceiling to provide side lighting for the upper walls

Below—A typical window, open at the rear for view into the store. The ceiling panel seen here is chiefly for decoration. Window display lighting is provided by a louvered trough with 200-watt units mounted in it, concealed behind the valance



solved by the use of large inverted bowls, built up of segments of sheet brass with a reflecting surface of polished chromium. The lamps were mounted near the rim and followed the circumference of the bowl, but were set back far enough to avoid lamp spots on the glass.

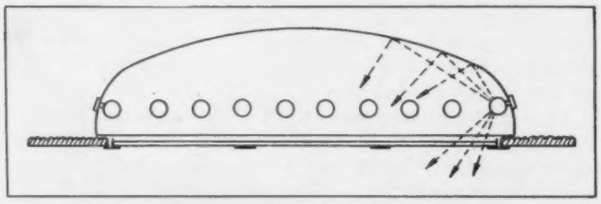


Fig. 4—Section showing special reflector bowl used above large circular flush lighting panels in main floor ceiling

In fact with lighting of this nature each inset panel presents an individual problem to be solved by careful planning or, sometimes, by experiment. No stock fixtures will fit all cases in this tailor-made lighting.

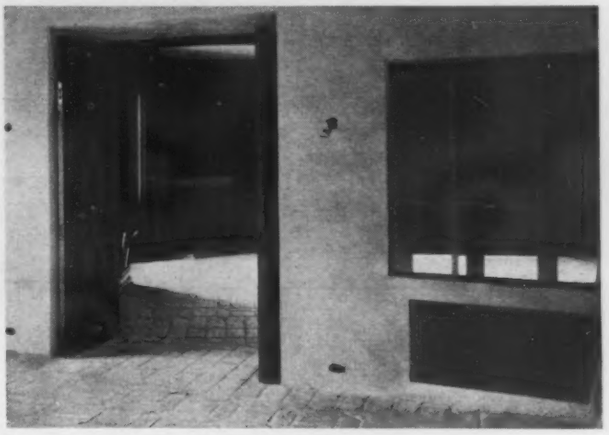
In closing, just a word of warning to other contractors: Some fixture salesmen are nothing but that, even though they may have "Lighting Engineer" printed on their cards. When illuminating engineering advice is needed, be certain that the counsellor is an expert before becoming committed to his ideas. Some are interested solely in the sale of their particular line.

Some New Wrinkles In Electric Heating

C. A. ROWLEY, Pasadena Electragist, who installed the electrical equipment at this home in Malibu Canyon, Southern California, worked out for King C. Gillette, of safety razor fame, a novel idea for combining ventilation with the heating. At the rear of each large wall-type heater an opening, in which a damper was placed, was cut through the 3-ft.-thick adobe wall to the outdoors (see view at right). Thus fresh air from outside may be drawn in at the heater and warmed before entering the house. The heaters are so wired that thermostats actuate remotely controlled contactors located in the soundproof organ blower room. Thus also the 18 kw. of living room heaters can be started by means of a 3-amp. toggle switch. Bullseye pilot lamps, mounted at two key locations in the house, indicate which heaters are on. The entire electric heating installation cost only 60 per cent of what a steam or oil system to supply such a residence would cost, requires no engineer to operate, guarantees a sootless, clean building, both interior and exterior, and maintenance and depreciation are nil.

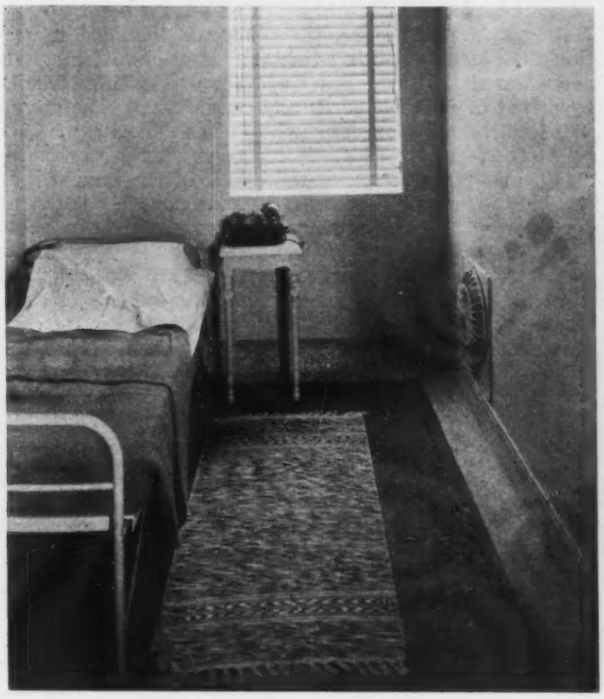
The saving of salary, living expenses and housing of an engineer, for which Mr. Gillette would have to pay if he had installed any other system, he believes will more than pay for the energy used.

Beautiful ranch home of King C. Gillette in Malibu Canyon near Calabasas, Calif., completely electrically heated. All employees' houses on the property are similarly heated



Corridor heaters as well as reception room units are thermostatically controlled. The vast number of treatment rooms is indicated below in this one of several such corridors. There are 58 heaters in all, the installation having been made by R. Max Fry, Los Angeles Electragist, who specializes in electric heating

In the Medical Research Building, on Madison Street, Los Angeles, a building heated entirely electrically, the fan type of wall heater solves a problem. The building consists of a large reception lobby, a few doctors' offices, and a large number of small treatment rooms (shown below). In these it is not necessary to have heat until a patient is about to enter, then warmth is needed quickly. Before assigning a patient to a room the nurse turns on the 2-kw. heater, the fan distributing the warmth to the entire room quickly



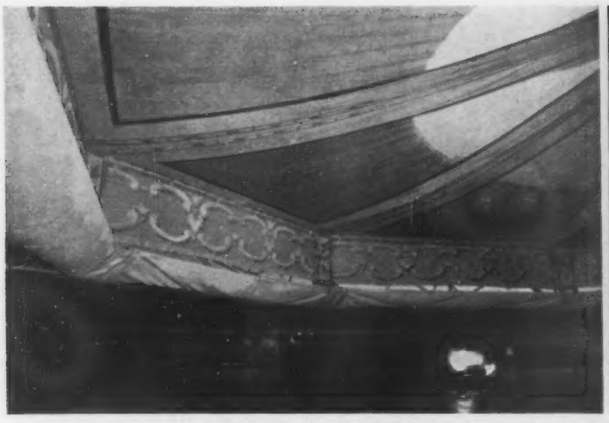


Fig. 1 (left)—Section of canvas canopy ceiling, with cove lighting trough at base of each section. Units were directed against canvas ceiling above each section. Fig. 2 (above)—Pipe supports for the cove trough inserted and concealed from view by the canvas flap shown hanging below. A cat walk behind the cove allows for lamping and servicing, even when suspended high above the floor

Today's Stage Spectacles Require Modern Facilities

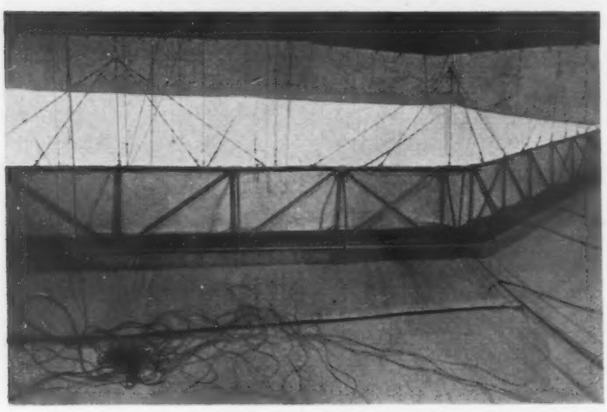
San Francisco's Civic Auditorium, Built During Exposition Time, Now Provided With Equipment for Handling of Anything From Opera to a Barn Dance

By HAROLD L. GERBER
Consulting Electrical Engineer, San Francisco

ORIGINALLY built in 1915, during the World's Fair at San Francisco, the Exposition Civic Auditorium, as it was then called, was a modern affair. Its pipe organ was a world wonder, its seating capacity rivaled a stadium, and its lighting was designed for the open exhibit building that it then was. Acoustically it was so unsatisfactory that large canvas drapes were provided to deaden echo, and a canopy overhead, likewise acoustical in purpose, shut off the light from a skylight by day and absorbed light at night.

Since 1915 the progress of years had more than exacted its toll from the electrical installation and the interior beauty of the building. This resulted in a decided loss in revenue to the city of San Francisco, as it was not often wanted for theatrical or industrial purposes.

Fig. 3—Looking down on the canopy from above. The cat walk may be seen



It was decided that the interior of the auditorium should be equipped to provide for any type of industrial exhibit or theatrical or operatic performance. The entire superstructure of the auditorium ceiling was to be covered by a canvas canopy, arranged in the shape of an octagon, and draped to a central support. The canopy was to be illuminated with cove lighting and the entire arangement so installed and constructed that the whole ceiling canopy could be adjusted or lowered directly to the auditorium floor.

The shape of the canopy is indicated in Fig. 1. The drape at the bottom of the canopy sides was installed to conceal the cove lighting strips, secured to the pipe battens and framework of the canopy support.

In Fig. 2 the construction of the cove lighting supports at the base of the canopy structure is illustrated. Across this space was placed a 1 x 12-in. Oregon pine backing and to this were secured the cove lighting sections, made in the form of lighting troughs with chromium plated reflectors mounted within them.

As was stated before, the canopy is installed in sections, is portable and is adjustable as to elevation. This necessitated the installation of all cove lighting circuits by means of portable cords and connections. During an industrial exhibit or dance the entire canopy and cove lighting effects are used. For a large operatic performance, employing a stage at the center of the rear wall of the auditorium, it is necessary to remove a section of the canopy and cove lighting troughs. To make possible provision for such conditions, each of the trough sections of cove lighting was so installed that sections could be plugged from one to another, and the lighting circuits supplying these sections could be plugged into the cove sections. Polarized twist lock plugs were used for this purpose and placed in gang boxes on the steel roof structure above the canopy. Circuits to feed these were run from this location to the control panel through 4-in. conduits suspended from the roof trussing and terminating at distribution centers at convenient locations high above the auditorium.

In addition to the cove lighting just described, 32 fixtures and one main fixture were suspended from the canopy ceiling. Each fixture had its own hoisting winch built into the structure above the canopy, and its supporting cable extended through guided holes in the canopy structure. A platform was provided at each winch position from which to raise or lower the individual fixtures. Plugging boards for the cove lighting

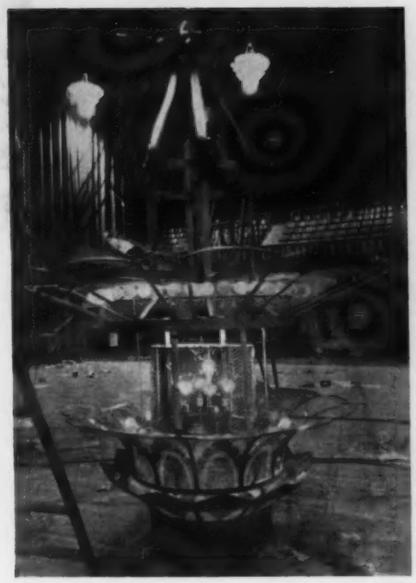
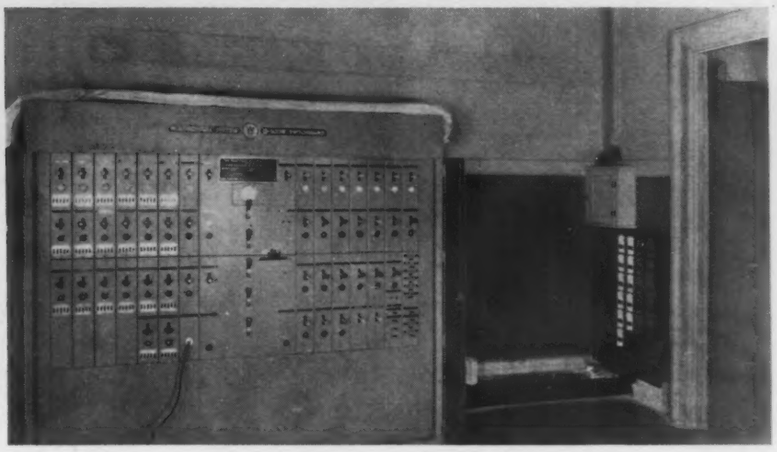


Fig. 4 (left)—View of central fixture under construction. A motor-driven color screen surrounds the lamps in the shaft for color changes. Other fixtures are seen above, suspended in place. Fig. 5 (below)—Stage switchboard with separate plugging board for dimmer circuits on a portable panel



units were placed near these positions next to the roof.

Each fixture, as indicated in Fig. 4, was of special make, of the design and construction as shown. The interior of each is illuminated from lamps wired for three colors. In addition to this effect lighting, there is installed in the base of the fixture a 1,000-watt high bay lighting unit to provide adequate general lighting for the entire floor below. The fixture illustrated here is the central unit which has a motor-driven color effect wheel, and is wired for 10,000 watts of lighting. The frame of the fixture is of metal and the panels are of painted sections of sheet mica. The color effect wheel consists of a cylinder containing sections of celophane wire mesh in colors, which revolves about the center shaft of the fixture containing a large number of lamps. As it turns it makes color changes in the mica of the fixture.

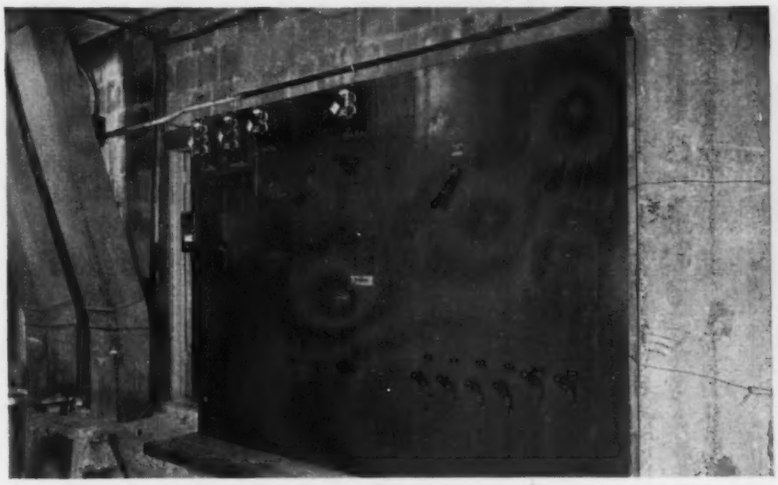
In addition to the fixture and cove lighting load of 300 kw., provision was made for 90 kw. of lighting for the auditorium stage. On the grids, above the stage, and wired from the stage contactor board, were installed groups of stage plugging panels, so arranged that any type of border or load could be readily connected to it.

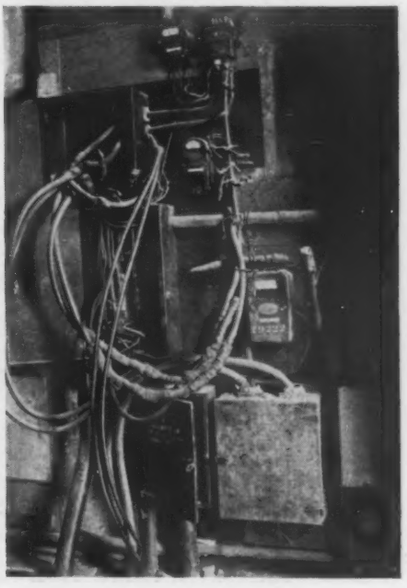
The entire stage load and circuits were run directly to the stage control panel in the auditorium basement. The entire ceiling load was run to a control panel in the dome of the canopy, a distance of 600 ft. from the stage switchboard. The controls from each control panel were then carried to a five-scene, stage board installed adjacent to the auditorium stage. This board was installed without dimmers, being made a part of the stage switchboard.

The entire lighting load was placed upon the three-phase four-wire, 120/208-volt network system. Two main services and switchboards supply the auditorium from the streets on both sides of the building. The building has wiring capacity for 9,000-amp. single-phase lighting load, 600-amp. three-phase, 240-volt load, and 600-amp. 120/240-volt d.c. at either switchboard location, enough to care for any type of theatrical or industrial exhibit.

This unusual and difficult electrical remodeling job was installed by the Alta Electric Co., of San Francisco, under the supervision of A. A. Schwartz.

Fig. 6 (right)—The old switchboard, patched up in an attempt to provide service to the auditorium before remodeling. Fig. 7 (below)—The main board which replaced that in Fig 6. Directly below is the contactor board. Behind it is stage board shown in Fig. 5





San Diego Breaks Red Seal Quotas

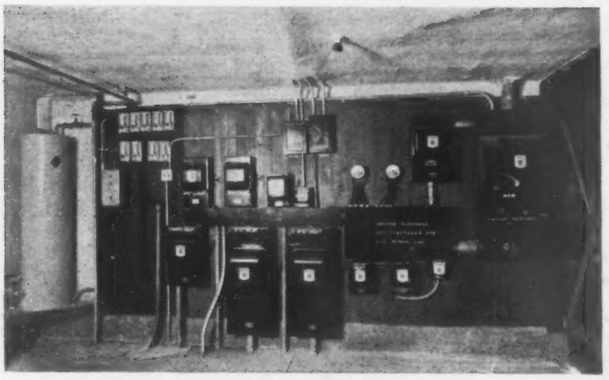
Charles Wakefield Cadman, noted composer, owns and occupies this recently completed Red Seal home in San Diego, Calif. The house is equipped for electric cooking, water heating, air heating and refrigeration, while the number of convenience outlets is considerably larger than the minimum specified for a Red Seal job. Ratner Electric Co. was the electrical contractor

JUST why California is becoming a Red Seal state may be perceived by a glance at the records of some of the state's all-electric-home promoters. Among these men, A. I. Benedict, in charge of Red Seal activities of the San Diego Consolidated Gas & Electric Co., has an enviable record of 140 per cent of quota set for Red Seal homes during one year. His 50-home quota was reached in the first six months. In his opinion, the reason for increased Red Seal popularity in the San Diego district is that the missionary work is being undertaken by power company employees.

Several large jobs were numbered among those in Benedict's report, including a few in the Rancho Santa Fe district for prominent motion picture stars. He also worked on two of the installations pictured on this page.

In the Riverside (Calif.) district, W. V. ("Slats") Pittman has been active in Red Seal promotion and points to a large percentage of the all-electric homes as his work.

Throughout the state, Red Seal wiring activities have been going forward actively, and a good showing probably will be made by the end of the year, in spite of general decreased building.



Top left—One of San Diego County's outstanding examples of Red Seal wiring is found in the Patio Laguna apartments at Coronado, exclusive ocean resort. The lagoon in the court is floodlighted in various colors. Grover Electric Co., San Diego, supplied the wiring

Center left—All switches are grouped together, the service being divided between two wings. Each of the sixteen apartments is equipped with an electric range, water heater, refrigerator, and air heaters. Even electric clocks and special radio connections are provided to give guests the utmost in convenience

Bottom left—W. V. Pittman, proprietor of the Electric Supply Co., Riverside, has installed many Red Seal homes amid the orange groves near that city. That pictured to the left is all-electric and includes a fountain, garden lighting and its own water supply system. "People who build homes out here expect to live comfortably," he says, "so I give them plenty of electrical convenience"

Combines Installations With Special Manufacture

NePage McKenny Co. Fabricates Switchboards and Street Lighting Equipment Used in Its Jobs

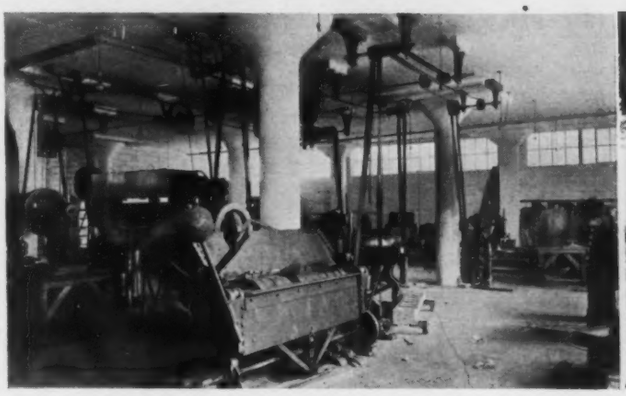
Headquarters for the West's unique chain of contracting establishments, at Seattle. Branches are maintained also at Portland, San Francisco and Oakland. Roy Kenney and C. B. ("Cap") Kenney, both vice-presidents of the firm, are managers at these cities respectively

Namesakes of the firm, J. F. ("Jud") NePage, president, and V. S. McKenny, secretary-treasurer, in front of their two-story office and shop building. The building was so designed that another story may be added later. The shops are in the combined first floor and basement, reached by a driveway ramp into a storage yard at the right of the entrance. The executive, engineering and accounting offices are at the front of the second story. A large storeroom takes the rear of the building

Below, left: Because the company does a large amount of street lighting installation in the Northwest, it maintains its own concrete standard manufacturing plant at South Seattle. The storeroom at the main office, shown here, therefore contains large stocks of street lighting glassware and equipment as well as wiring stock. An elevator conects first floor and stockroom, and an outside elevated ramp provides direct loading to trucks

Below: Seattle's city ordinance has long been so written that only special panels and switch cans are allowed. Therefore this company makes its own cans and mounts standard manufacturers' switchblocks in them. The equipment required to cut, punch and weld the heavy metal is complete in this department

Below: A winding department is maintained to manufacture the transformers necessary for series street lighting standards. That department is seen at the rear of the picture. In the foreground is a space used for assembly of switchboards



Modernizing the Motor Specialist

Changes From Old to New Style of Motor Shop Best Evidence to Customers of the Value of Doing Likewise

Old style motor shop it was, with a miscellaneous assortment of second-hand motors in the center of the floor and offices ranged along each side

ALWAYS a progressive motor and industrial contracting business in Los Angeles, Quality Electric Works nevertheless received a new lease on life when a syndicate of well know electrical men in that city took over the interests of its former owner, A. W. Wotkyns, and placed the concern under the management of J. O. Case, former assistant local manager of the General Electric Co. (See ELECTRICAL WEST, March 1, 1930, p. 164.) Soon after assuming control a plan of modernizing its own shop and offices, considered tentatively by Mr. Wotkyns previously, was actually effected. Offices which had been separated by a floor display of second-hand motors, were grouped together in the center of the room; displays of merchandise were ranged along each side. Details of the rearrangement are best seen in the "before and after" photographs reproduced herewith.

J. O. Case, president and manager of Quality Electric Works, Los Angeles

Combined with the motor repair business and industrial wiring, under the new organization, is distributorship of various lines of equipment. Space was made for a larger Rockwood paper pulley stock, for which the company is distributor in the territory. Display facilities for Black and Decker portable tools, also represented, and recently a service department for repair, sales and rental of Weston and Esterline-Angus graphic instruments and Biddle scientific apparatus have been added.

After a year of operation under the modernized set-up Mr. Case is enthusiastic about the benefits of modernization and uses his own experience to sell the idea to industrial plant customers. He also feels that the distributorship for several related lines is a profitable adjunct to the business, giving diversity to the basic wiring and motor repair business and offering the company something special to sell both as a lead for new business and to round out the services of the shop.

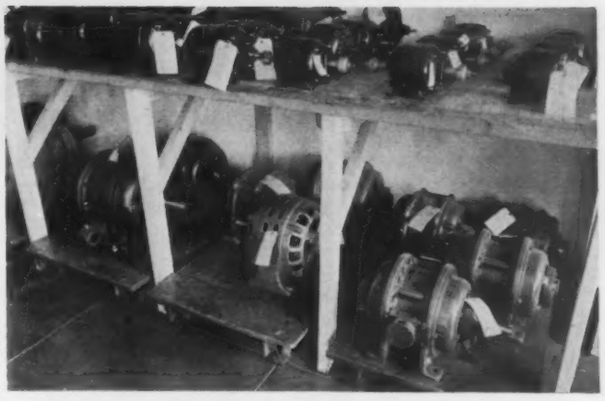
Active interest in power company, electrical manufacturer and wholesaler, as well as California Electragists Motor Section affairs, and wide awake participation in civic and industrial trends in the community are all valuable assets which the motor shop should cultivate, according to Mr. Case. All of these provide important leads to new business, establish the firm as a leading electrical establishment, and bring it most of its business without competition on a basis of superior service rendered. Maintaining of relations with customers, close supervision of every installation, bringing to the customer of new devices and ideas, as well as intelligent estimating and planning had always been the hobby of the late J. R. Wilson, estimator for the firm, who contributed many articles on estimating to ELECTRICAL WEST. Larry Ellett, of this firm, is chairman of the Los Angeles Estimators Section, Calif. Electragists.

Despite curtailed industrial programs during the past eighteen months, Mr. Case says that the business done by the firm has held up very well, that the syndicate owning the company has earned a substantial dividend, and that in general business has been good. This is not attributed to any trick stunt, extensive drive or special activity, but to the close follow-up of a greater number of small jobs, and the active selling of that which the name of the firm implies, quality.

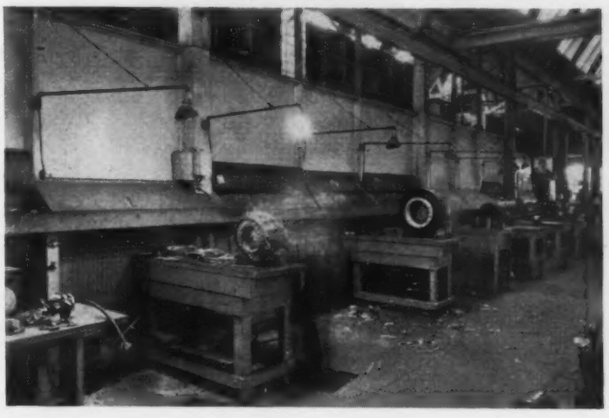
Now at the left of the entrance is the jeweler-like repair booth for servicing of delicate testing instruments for which this shop is the official service station. Cliff Adams, technician in charge, is shown in his "cage"

Above—Consolidated offices take the center of the room in the new arrangement, utilizing the space formerly devoted to the second-hand motors (as seen on the opposite page). This makes for office efficiency, keeping all departments in close touch, places the accounting department at the front where the girls may receive the customers. Merchandise and motors are ranged along each side, with attractive window displays at the street. The shop and stockroom remain at the rear

Stockroom entrance from which wiring supplies are sold to industrial customers who come in. The stock man has no difficulty filling orders for the shop or outside construction work either, since the stockroom is accessible to either the rear alley driveway or the shop adjoining it. Offices of the engineering estimators and the executives of the company are immediately in front of the stockroom and are interconnected



Instead of being spread on the floor the motor stock is also kept in attractive shape. The small motors are placed on a metal-covered table bench along the wall. Larger sizes of motors are kept on platforms under which a lift truck may be run to bring them out for examination or test. All motor stock is neatly painted and tagged with a description of its characteristics



Left—Work benches in the winding shop are ranged along the stockroom wall. An individual bracket light is provided over each bench, and a bin shelf for keeping tools within easy reach. The bakeovens and testing facilities are just across the aisle. An overhead crane serves the entire area. Compact arrangement and natural sequence of operations are promoted by the placing of the various units of the shop

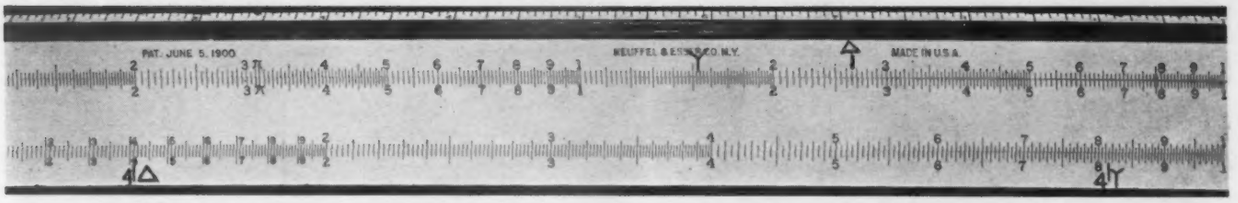


Fig. 1—Slide-rule marked with gage points to assist in making winding data calculations

Winding Calculations Reduced to Single Slide-Rule Setting

By W. O. Hurlbut
San Francisco

TEDIOUS and involved processes for working out winding data for commercial polyphase motors very often can be reduced to much simpler operations which are well within the necessary commercial accuracy. The method of securing a winding layout illustrated herewith, permits easy, rapid calculation of turn per phase and wire size for any given frame size. That results obtained from these calculations are of practical commercial value is attested by the fact that they check closely with data taken from a representative group of general purpose motors of varying horsepower and speed.

SYMBOLS

Yt	Turns per phase for a star connection
Δt	Turns per phase for a delta connection
D	Diameter of stator bore
L	Length of stator core
E	Volts
n	Frequency
B	Lines of force per square inch in the air gap (assumed 24,500)
N	R.p.m.
s	Coil span in slots (9 when pitch is 1 and 10)
S	Total number of slots
P	Number of poles

Preparation of slide-rule for calculating turns per phase

Using the accompanying symbols, the formula for the primary turns of a three-phase, semi-closed slot, general purpose induction motor of popular dimensions may be expressed as:

$$\Delta t = \frac{10 \times E \times P}{n \times B \times .636 \times \pi \times 4.25 \times L \times D}$$

Then assuming the calculating standards, E = 440 volts, P = four poles, and n = 60 cycles, all factors except D and L become constants and are reducible to 1,410, which is permanently marked 4Δ as shown on Fig. 1. Set the product of the variables, D and L, on scale C over index mark 4Δ. Then, turns per phase delta are indicated on scale D under index C.

Similarly, for direct calculations of turns per phase when the winding is Y-connected, the factor becomes 1,410 divided by the square root of 3, or 815 as permanently marked 4-Y on scale D.

Setting for calculation of turns per phase for a delta-connected motor

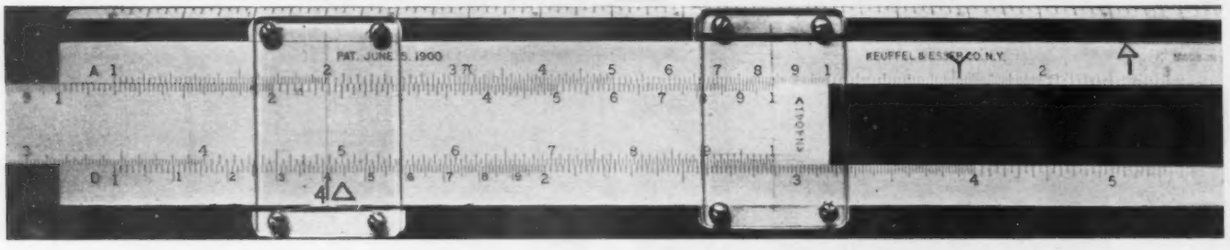


Fig. 2—Assuming a core with a diameter of 8.875 in. and a length of 5.5 in., LD equals 48.8 Set 48.8 on scale C over 1,410 (4Δ) on scale D. Answer 289 turns read on scale D under index C

Preparation of slide-rule for calculating conductor area

To calculate conductor area for a Y-connected winding at a given horsepower value, a conductor loading of 500 circ.-mil per ampere is assumed. Assuming a representative power factor of .89 and efficiency of .84 permits the use of the following formula:

$$\frac{.89 \times .84 \times E \times \sqrt{3}}{746 \times 560} = 153$$

This figure is reciprocal of the circular mils per horsepower. At 153 on scale A mark gage point Y. The conductor area in circular mils for any given horsepower can then be read on scale B under either A index, when the horsepower figure on scale B is set underneath gage point Y.

Similarly, for calculating conductor size for a delta connection, the gage point becomes 153 times the square root of 3, or 266, which is permanently marked "Delta" on scale A. To determine the conductor size for a Delta connection, set the horsepower value on scale B under Δ at 266 on scale A. Circular-mil area then is read directly on scale B under A index. Fig. 1 illustrates marking of these gage points.

Setting for calculation of turns per phase for a star-connected motor

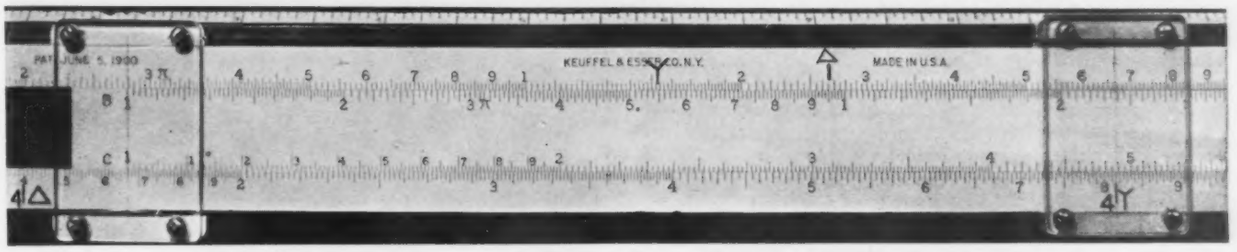


Fig. 3—Assuming a core of the same dimensions as given in Fig. 2, set LD (48.8) on scale C over 815 (4-Y) on scale D. The Y turns per phase then are read as 167 on scale D under index C

Setting for calculation of conductor area for a 30-hp. star-connected motor

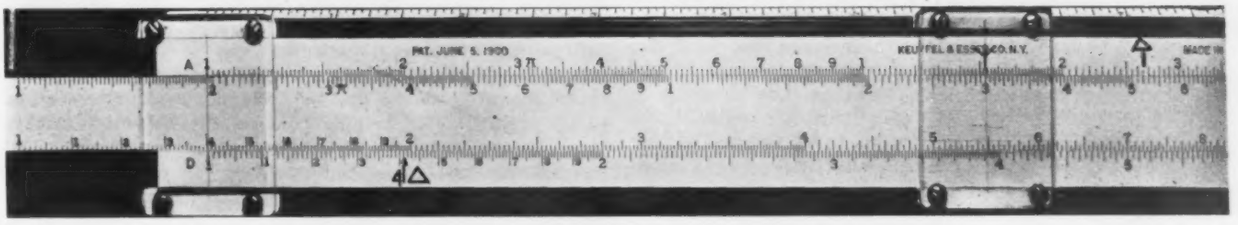


Fig. 4—Assuming a 30-hp. motor, set 30 on scale B under index Y at 153 and read 19,200 circ.mils on scale B under the left A index

Setting for calculation of conductor area for a 30-hp. delta-connected motor

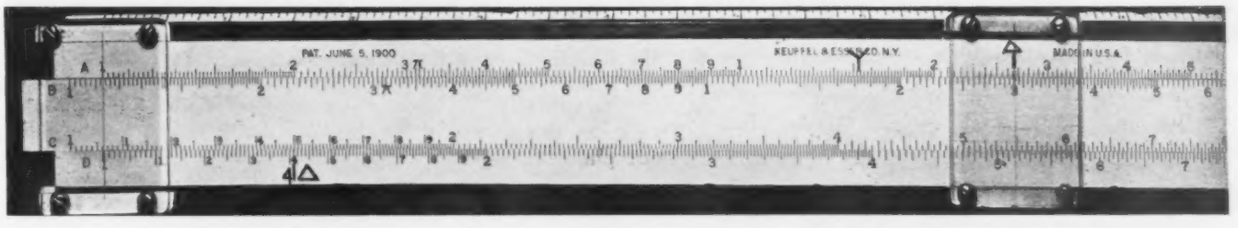


Fig. 5—Using the same motor as illustrated in Fig. 3, for a delta connection, set 30 hp. on scale B under Δmark at 266 on scale A and read 11,280 circ.mils on scale B under index A

Adjustment and conversion factors

To convert to the number of turns for other speeds, multiply the four-pole turns per phase by the inverse speed ratio. Example, in finding equivalent number of turns for a six-pole winding for the core used in the above examples, 6/4 times 167 equals 251 turns for a Y connection, 6 poles. Conductor area varies inversely as the number of turns, necessitating a corresponding decrease in horsepower output for a given core. The area of a pole face varies inversely as the number of poles. To insure ample area in the yoke to accommodate the flux, the product of five times the cross-sectional area of the yoke should be greater than the area of a pole face.

In cording the winding multiply the turn by the factor derived from the formula:

$$\text{cord factor} = \sin \frac{90 \times s \times P}{S}$$

For example, if 72 slots, six poles are to be corded, 1 and 10, s equals 9 and the formula gives the sine of 67.5 deg. The cord factor is a sine of this angle or .924 which, when multiplied by the Y turns, gives the number of turns for a winding using this cord factor.

Automatic Weighing Utilizes New Device

By R. E. BEAR
General Electric Company, Los Angeles, Calif.

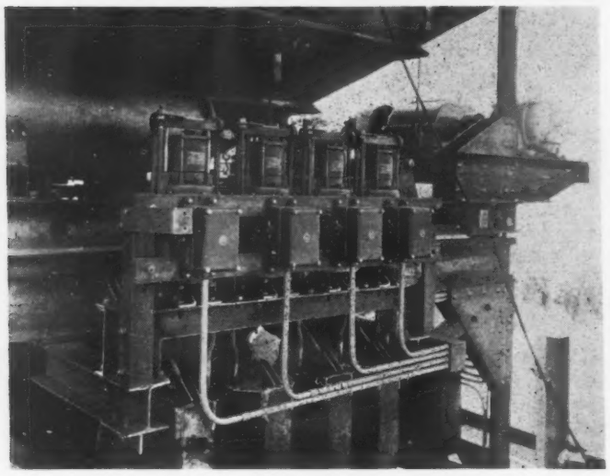
AUTOMATIC weighing in an asphalt paving plant of the Standard Boiler and Steel Works of Los Angeles has been made possible by the application of a comparatively new development in the field of industrial electrical devices. Use is made of the new G.E. thrustor, which combines the straight line motion of a solenoid with the comparatively low inrush current and power requirements of a fractional horsepower motor.

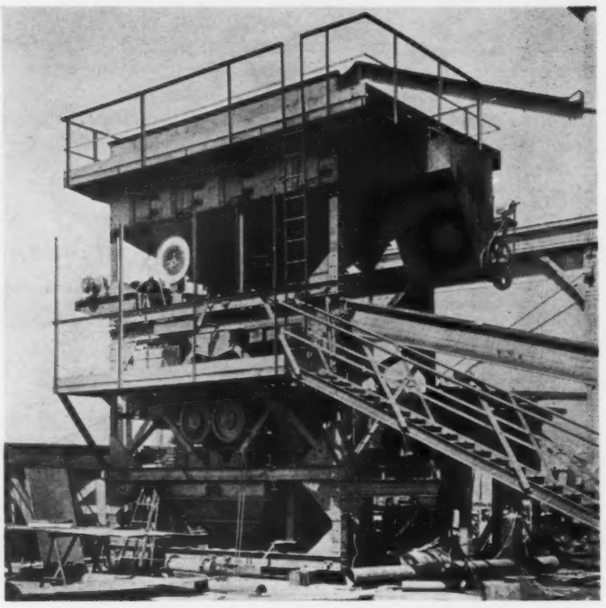
By means of a small, motor-driven, centrifugal impeller mounted in a close-fitting piston, oil is forced under pressure through ports so located as to allow the pressure to be built up in a small chamber. The pressure within the chamber forces the piston upward with a thrust whose magnitude depends upon the physical size and design of the thrustor. Travel of the piston is made available externally by means of pushrods secured to the piston and extending through the top of the device. The return stroke is accomplished by gravity, springs or counterweight after the motor is de-energized. It performs services similar to those of air and steam cylinders, hydraulic cylinders, and large a.c. and d c. solenoids with the advantage of economy, simplicity and smoothness of operation. In addition, the thrustor is free from the inherent shock of a magnetic solenoid and has the further value of being able to be stopped at any part of its travel without damage to the motor, a magnetic solenoid under similar conditions being liable to burn out.

The power thrust can be varied by changing the motor speed with a rheostat when equipped with a d.c. or single-phase a.c. motor. A time adjustment on the power or return stroke can also be obtained by controlling the flow of oil through the piston. External adjusting means are provided to accomplish this result.

As a part of the automatic weighing device, these thrustors accomplish the opening and closing of the gates in four separate bins which contain an aggregate of paving mixture. Each thrustor is actuated in response to electrical circuits completed by adjustable contacts mounted on the dial of a standard springless scale. This scale dial is mounted on the operator's platform and the operator adjusts the contacts so that each thrustor in sequence holds its respective bin gate open for a length of time determined by the setting, each amount of aggregate thus weighed automatically totaled to a predetermined value. The return stroke is accomplished by means of counterweights.

Controlling the gates of aggregate hoppers, these four thrustors are actuated by contacts on the scales, thereby accurately predetermining the amount of material used in paving mixtures





General view of the hopper showing the weighing platform scales. Movable contacts on the face operate through the thrustor to close hopper gates when required weight of material has been reached

The advantage of electric control and the characteristics of the stroke are such as to be very desirable also for controlling the operation of mechanical clutches and brakes on mine hoists, ore bridges, and industrial hoisting equipment. Successful applications have been made on punch presses for clutch operation, resulting in a pronounced reduction in fatigue due to the old-style hand or foot levers. Clamping, feeding, and ejecting operations in machine tools are successfully handled by the thrustor. Sliding doors, valves, ore unloaders, and bin gates are typical applications.

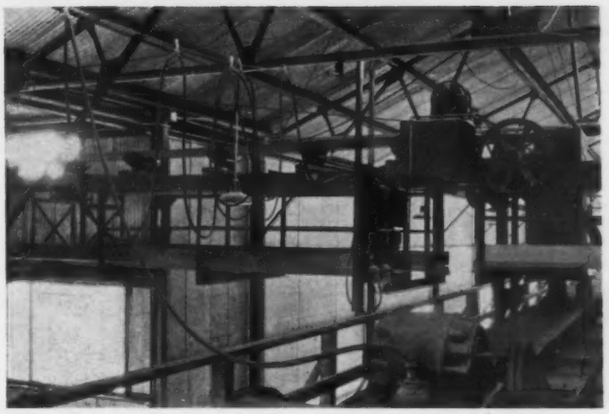
▼

Flexibility Possible In Shuttle Conveyor

COMPLEX material delivery will find the use of a shuttle conveyor, as illustrated herewith, an economic means of accomplishing the desired result.

The carriage structure with the driving motor is so constructed that it can be moved back and forth between two or more main line conveyors or, as in this case, storage hoppers. As the motor not only moves with the conveying carriage but also must be reversible, special electrical features must be incorporated in the design of this piece of apparatus.

In plant No. 3 of the Stockton Firebrick Co. near Pittsburg, Calif., recently installed by T. L. Rosenberg Electric Co., Oakland, this function was accomplished by means of a flexible three-conductor cord supplying power to the motor from two heavy-duty receptacles.



Shuttle conveyor in plant of Stockton Firebrick Co. Power is supplied the motor through a flexible three-conductor cord on a pulley system. Magnetic starting switches and indicating lamp add to the economy and safety of the installation

These receptacles were so wired as to produce opposite rotation in the motor, through reversing of phase in one receptacle. The slack of the portable cord is taken up on a loose system of pulleys riding on the steel messenger cable fastened to the roof trusses as shown.

To avoid extra control cable, magnetic starters are used, the push button being mounted adjacent to the receptacle. As a safety feature, a red indicating light can be mounted above the receptacle so that the plug may never be inserted when the magnetic switch is closed and the receptacle energized. An 18-volt signal lamp in series with a 440-volt resistor provides this feature without the use of special equipment.

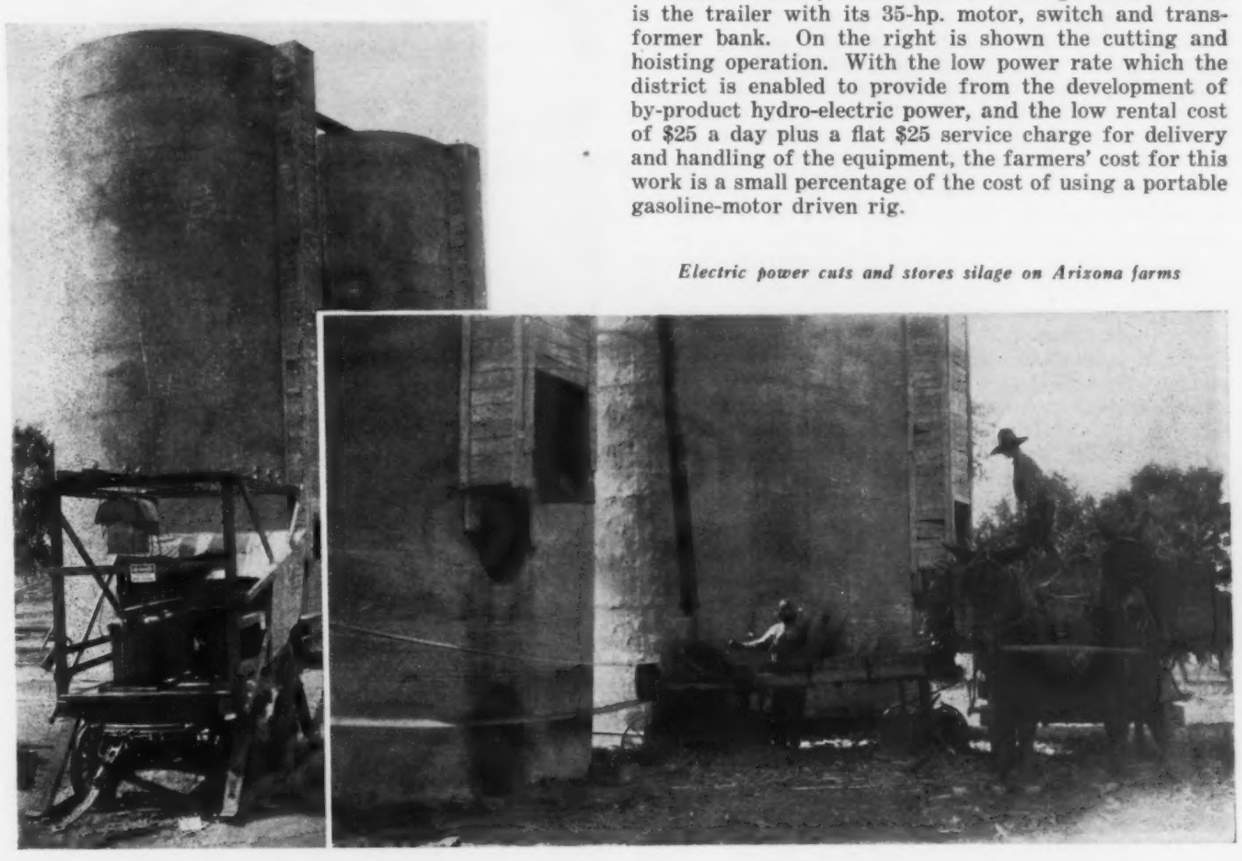
Motor Forum Returns

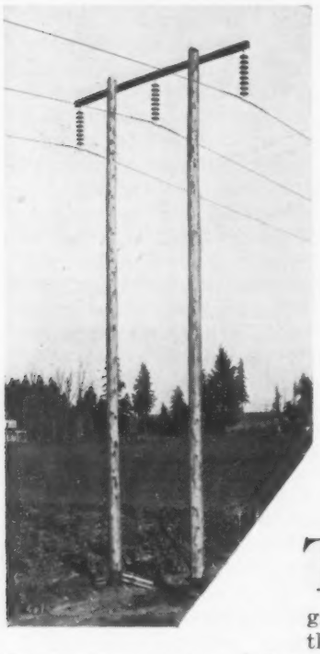
When a rearrangement of the contents of ELECTRICAL WEST, classing the material according to the individual interests of its many groups of readers, seemed desirable, the *Motor Forum* pages, then a part of the "Ideas for the Contractor" department, were expanded and enlarged to include all types of industrial applications of electricity under the general group heading of "Industrial." Since that change a widespread expression has reached the editors from motor specialists that a particular department be reserved for an exchange of ideas and methods for motor shop operation and business development. Beginning with the next number, therefore, two pages will be set aside in each issue, excepting only the special issues, for such a *Motor Forum*. As in the past, ELECTRICAL WEST will welcome contributions from the field and will pay for those used. The value of the department will lie in its usefulness to the motor specialist.

Farmers Benefit From Portable Rig

ONE of the services which the Salt River Valley (Ariz.) Water Users Association gives to its 8,000 electrified farms is the use of this portable farm power plant equipment at a nominal rental. The unit shown is used extensively to cut and hoist silage. On the left is the trailer with its 35-hp. motor, switch and transformer bank. On the right is shown the cutting and hoisting operation. With the low power rate which the district is enabled to provide from the development of by-product hydro-electric power, and the low rental cost of $25 a day plus a flat $25 service charge for delivery and handling of the equipment, the farmers' cost for this work is a small percentage of the cost of using a portable gasoline-motor driven rig.

Electric power cuts and stores silage on Arizona farms





Transmission Practice In the Northwest

Comparison of Recent Additions to 110-kv. Circuits by Utilities in Oregon, Washington and Idaho Offer a Basis for Determining the Trend Toward a Standard of Design for Lines of This Voltage. Wood Pole Supporting Structures Are Used in This Territory to a Large Extent.

TRANSMISSION line practice is governed largely by the geographical characteristics of the territory to be served. In the three states of Oregon, Washington and Idaho, comprising the Pacific Northwest, marked differences in climate and terrain contribute to the factors which determine the transmission standard in that section of the West.

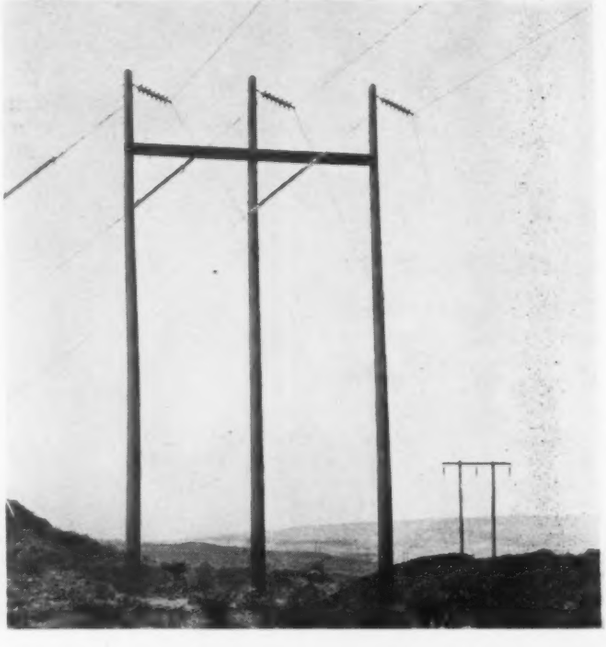
Population is centered in the extreme western half of Oregon and Washington, where Nature has provided numerous deep water harbors within easy access of both the heavily forested slopes of the Coast and Cascade Ranges and the large, fertile area between the two. Agriculture and lumbering have stimulated manufacturing in the seaport cities and the electrical load density from these and other associated industries has resulted in a rapid development of available hydro sites. East of the Cascades the situation is somewhat different, the climate being far more arid and the population at a relatively much lower density.

However, from the transmission engineering standpoint, the determination of power line characteristics results in approximately the same answer for either section. In the western half of the state relatively large blocks of power have been developed, but the proximity of hydro-electric sites to the centers of distribution has established 110 kv. as the economical upper limit for the majority of the installations. In the eastern section large blocks of power have not been necessary up to the present time, although the distances between the generating plants and centers of distribution are, in general, larger. The combination of these two factors also has determined 110 kv. as the economical long-distance transmission voltage for these circuits. As a final consideration, the majority of utilities in the section have standardized on 110-kv., thus permitting major system interconnections of the future to be made with a minimum of equipment.

Significant is the economic valuation placed on wood pole construction by independent engineering opinion.

The five installations of 110-kv. lines described herein use wood pole supporting structures, except in one instance where a few miles of a line were placed on double-circuit steel towers because of limited right-of-way in a mountain canyon. Where conditions permit its use, the power company engineers feel that wood pole construction permits economies in line construction and offers certain advantages in line operation. In all cases enumerated in this survey, the H-frame construction was used, fittings, guyings and other minor details varying according to the company's practice. Operating companies attribute the popularity of the wood pole construction to its ability to show a somewhat reduced investment cost. Savings reported through the use of this type of construction vary with the topography and loading of the line itself, one company estimating an economy of approximately 20 per cent in structural costs compared with other types of line construction through the use of two separate wood pole lines. Improved

Tangent and angle tower on a 110-kv. line of the Puget Sound Power and Light Co. Wooden guy insulators enable guys to be placed for maximum structural strength without impairing the impulse flashover values of wood pole construction



insulating characteristics, particularly for impulse flashover values, also are given as factors governing the selection of wood pole structure for high-voltage transmission in the Northwest.

Transmission engineers of the Northwestern companies estimate that the average life of a butt-treated wood pole transmission line will be from thirty to forty years. Considering local conditions, it was felt that this figure offered a basis of comparison with the permanence of a steel structured line. Wood pole construction has the disadvantage of being susceptible to fire hazard. This is particularly true in the heavily timbered areas of the Northwest and extreme care must be taken to provide protection from this potential source of line failure.

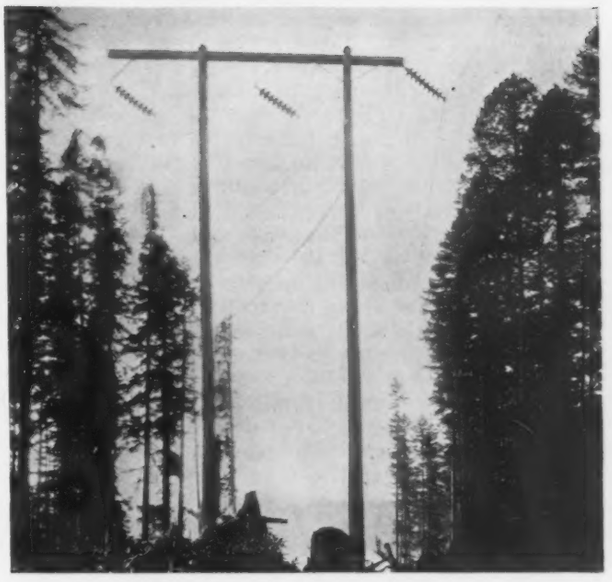
In designing and constructing a transmission line in this section of the country many problems arise. Most of these are due to the rugged character of the country traversed and the heavy timber growth for which the mountains of Washington and Oregon are noted. Methods of dealing with these problems are best explained in individual treatment of the lines under consideration. In the following discussion of each individual line, construction features will be coordinated around the major problem or problems whose solutions may offer constructive ideas for similar projects. Thus certain construction details, subordinated in order to emphasize a feature in one installation, will be expanded upon in the description of another line whose characteristics better illustrate the principles involved.

The California Oregon Power Company

To make the increased generating capacity of the company's Coast steam plant at North Bend, Ore., available for general system use, The California Oregon Power Co. constructed a 110-kv. transmission line from its North Bend plant across the Coast Range to tie in with an existing transmission line from its Prospect hydro development to the Springfield substation.

Reconnaissance surveys and a study of available maps indicated that three general routes might be possible. The first and shortest route studied was a direct line from North Bend to Dixonville, the tie-in point selected. This location was abandoned on account of the extremely rough and heavily timbered country to be traversed and because there were no roads over which men, materials and supplies could be transported. Further contributing to this decision were the excessive prices demanded for stumpage timber on the right-of-way. Another location following in a general way the existing state highway from North Bend to Roseburg, and greatly simplifying transportation difficulties and other construction problems was considered. This location, however, would have required approximately 95 miles of construction, which is 30 miles longer than the final route selected, and for this reason this location also was abandoned. As in most engineering problems, the third and final location was a compromise between the advantages and disadvantages of the other two. This location required the construction of 65 miles of line, following the route of an old military wagon road from Roseburg to the Coos Bay district. Final surveys of this location showed the geographical characteristics would permit construction to be carried on from several points.

For one-third of the distance, from Dixonville to the foot of the east slope of the Coast Range, the line crosses a series of rolling hills covered in part by small second-growth timber and brush; interspersed are orchards, cultivated fields and open range lands, the whole offering no special difficulty from the construction standpoint and easily accessible from good gravel roads.



Angle tower of The California Oregon Power Co. illustrates another method of attaching insulator strings. Inner string mounted directly on crossarm, while angle brackets are used for the remaining two

The middle third of the line, crossing the Coast Range Mountains, is one of the most difficult pieces of transmission line construction ever attempted by this company and probably one of the most difficult ever built in the Pacific Northwest. This portion traverses a very rough section of the country, heavily timbered with a virgin growth of trees, many as large as 8 ft. in diameter. The section being inaccessible from any existing roads, a road crew was started, immediately following the final survey, to improve the abandoned military road previously mentioned. This road had been closed to public travel for several years and was impassable to any conveyance except saddle horses, many places being still covered with the planking used in the days of horse-drawn vehicles. Slides had occurred, timber fallen across, and bridges had washed out. Before it was possible to transport any material to the transmission line right-of-way, several thousand dollars had to be spent in road work. The road, offering the only means of accessibility to the region, was a dominating factor in locating the line through the mountains. To keep the line reasonably close to the road, it was necessary to locate it along the side hills for several miles. So rough was this section of the country that it is not uncommon to find line structures of two poles spaced 12 ft. 8 in. apart having a 15-ft. difference in length, the tops of the poles being at the same elevation. In addition, heavy timber in this section presented a serious and expensive problem in clearing the right-of-way.

Offering a relief from the heavy going through the mountains, the last 20 mi. of the line traverses several small cultivated valleys. This section also had a very rough and broken profile, and while the virgin timber had been cut off except for a few miles, the second-growth timber and heavy brush made clearing of the right-of way slow and expensive work.

The survey of this line, made by two survey parties, took slightly over three months. Supplementing other studies, an airplane reconnaissance was made which was of very material assistance.

To expedite construction, work was carried on simul-

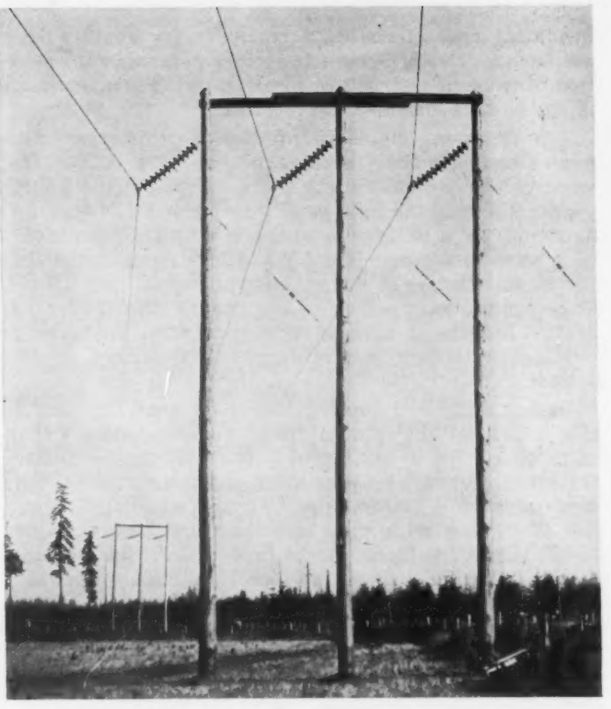
taneously from three construction camps placed approximately at the end of each of the three sections of the line described above. Construction crews also worked out of Roseburg and Marshfield, 350 men being employed on the job during the peak of operation.

Clearing of the right-of-way was the major construction problem encountered, it being the first part of the work begun and the last completed. The right-of-way varied from 90 to 150 ft. in width, and in addition to this strip, which was cleared of all trees, it was necessary to cut danger trees in some cases as far back as 300 ft. on either side of the line. Accessibility of the line was also taken into account in connection with the clearing. In places where it would take several days to reach and repair a break, more clearing was done than in other sections of the line which could be reached in a short time.

Design features of the transmission line are of interest. Supporting structures are of the two-pole H-frame construction, with a normal pole length of 55 ft. All poles are Class "B" Western Red Cedar, butt treated, spaced 12 ft. 8 in. apart on centers, and carry 6 x 8-in. Douglas Fir crossarms 26 ft. long. Copper conductors are placed in flat configration and are insulated by strings of seven 10-in.-suspension, clevis-type insulators. Dead ends and heavy corners require 3-pole structures, about which connections are made to the poles instead of being supported on crossarms. On this latter type of construction nine insulators per string were used. Patented splices were used for all conductor splices made in the line. The construction described above was used throughout the entire line with the exception of a 5-mi. section on the North Bend end of the line. Here an interesting type of construction was necessary, the line being supported on single poles using two 12-ft. crossarms. This is one of the few instances known where a 110-kv. line was supported on a single wood pole, this construction being necessary by reason of the fact that the location was made on street lines through subdivisions which would not permit the use of two poles and long crossarms.

For operating purposes, a telephone line was also constructed along the transmission line right-of-way. Run on poles 40 ft. from the center line of the transmission line, this line consists of a No. 6 extra heavy strength, copper-weld conductor supported on 6,600-volt pin type insulators. Both the transmission line and the telephone line are designed for N.E.S.C. medium loading, except for a 20-mi. section over the mountains which was designed for heavy loading to take care of the snow load.

Transposition structures of the Northwestern Electric Co. made necessary by limited right-of-way



Heavy angle structure of the Northwestern Electric Co. Insulator strings attached to pole below the double crossarm construction

A big item in the construction problem was the transportation and delivery of materials to the right-of-way. Railroad transportation was available only at the end of the line, making auto-truck delivery of materials to the location necessary. For hauling poles a 6-cylinder 1½-ton truck was used with a specially designed trailer so fitted with a steering connection that it could be controlled by a steering-wheel on one side. This trailer was similar to the trailer of a hook-and-ladder fire truck and was handled by a man riding on the extreme end of it. Extremely narrow, crooked roads made this arrangement necessary and it served its purpose in a highly satisfactory manner. Two light trucks without steering trailers were used during the peak of the job for hauling poles and handling crossarms. The hauling of the transmission conductors was done on a 2½-ton truck equipped with a power winch. Miscellaneous trucks handled other material.

As very few sections throughout the length of the line permitted delivery of the material at the required location, it was necessary to have a crew build trails and pack materials to the right-of-way. Teams, pack horses and crawler-type tractors were used, and for most of the job a crew of logging riggers was employed to get the material from the road to the right-of-way, an extremely difficult job calling for great ingenuity. As an example, one instance required a logging high line to place the material for half a mile of the line on top of a high ridge, otherwise inaccessible except on foot.

Teams, tractors and piking were used in raising the poles into position. On this line the topography would not permit use of special derrick equipment, which is about the cheapest and easiest way of raising poles. Teams were used for pulling out and sagging the wire, except on a portion of the line through the mountains

where it was impossible for teams and tractors to travel along the right-of-way. In the last mentioned section it was necessary to carry a ⅜-in. plow steel lead line by hand for half a mile at a time. All three conductors were then attached to the plow steel, which was reeled in on the drum of a hoist mounted on a tractor spotted at a convenient location.

Consideration of various spans in the line offer interesting information. The average span is 773 ft., the longest span 3,260 ft., very nearly a record for wood pole construction. Brass core wire and drawn splices were used for the first time by this company. Four of the longest spans averaged 2,135 ft., spans of this length being necessary on account of the abrupt changes in profile. In one place there was a 700-ft. change in elevation in a 1,500-ft. horizontal run; in another the elevation changed 500 ft. in a 600-ft. horizontal run, several others having like proportions.

Practically every type of difficulty found in the Northwest was encountered on this project. Rough, inaccessible country, heavy timber growth for which high stumpage charges are demanded, subdivisions requiring variation in the supporting structures, and topographical limitation placed on the type of construction equipment used, are problems to be dealt with in all transmission construction in the Northwest. This line typifies the construction difficulties encountered in this section of the country.

Northwestern Electric Company

Two predominating features, which will be described in detail hereafter, governed the design of this line. The first of these was the balancing of all insulation to ground against steep wave front surges, giving full recognition to the insulating value of wood poles and crossarms. The second was the method of obtaining the high structural strength necessary to support large conductors under heavy loading.

This line is comparatively short, being approximately 27 mi. long and connecting the Ariel development of the company with its substation in Vancouver, Wash. Constructed before the work had begun on the power site, it will serve the dual purpose of supplying energy for construction purposes and of transmitting energy from the development when the first generating unit goes on the line.

Wood pole H-frame construction is used throughout the length of the line. For deadends and heavy angle structures three-pole structures are used. Spans vary from the average of 500 ft. to a maximum of 1,300 ft. Insulators for normal line suspension consist of eight 10-in, units, while deadends and angle strings are made up from twelve units. Large size A.C.S.R. conductors, having an area of 636,000 circ.-mils were selected, the selection being based on an economic balance between line fixed charges and the value of power lost in the line on the estimated load of 40,000 kw. at 60 per cent load factor, together with the necessary peak load capacity for an emergency demanding from 60,000 to 75,000 kva. In conductivity these conductors are equivalent to 400,000-circ.-mil copper conductors.

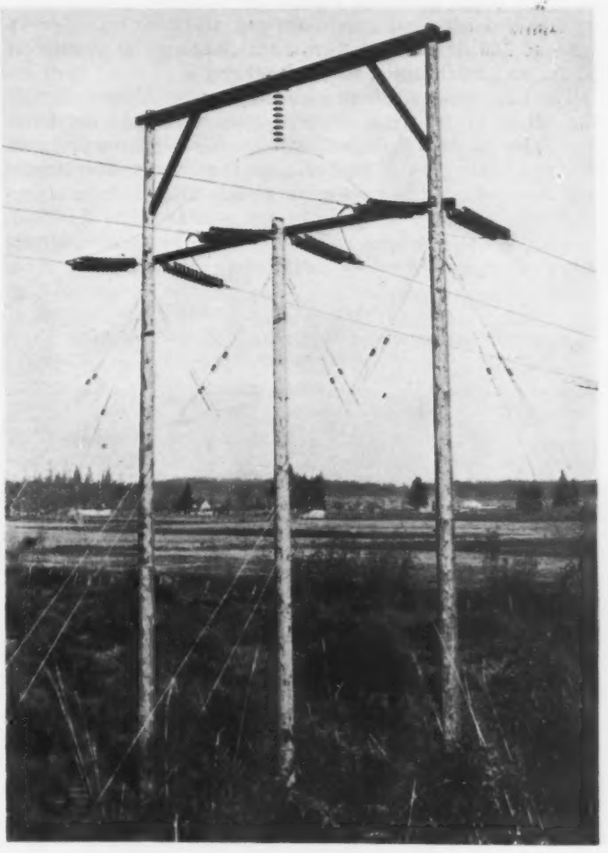
Two 60-ft. Western red cedar poles of the largest size available are spaced 11 ft. apart. On the normal span the conductors are placed in flat configuration, a group of 10-99-in. armor rods being used at each point of attachment to the suspension insulators to damp out destructive mechanical vibrations, a feature not usually provided for in the Northwest. For the long span three-pole structures are used, the conductors being dead-ended to the pole with jumper loops carried around on a suspension unit from offset crossarms. All insulator hardware is drop forged steel with a mechanical strength of 18,000 lb., which is a little above the elastic limit of the conductor.

Crossarms selected were 5½ in. x 7½ in. x 23 ft. long, and were manufactured from super-structural timber as defined in West Coast Lumbermen's Assn. grading rules. After surfacing and boring were completed, crossarms were pressure treated, using a mixture of 50 per cent creosote and 50 per cent fuel oil, giving an 8-lb. treatment to the cubic foot.

This method of treatment was selected because of the desire to use treated crossarms, and the short period of time available to complete the line. The method was not entirely successful, however, the untreated arms having been exposed to the sun for two or three days and the temperature in the treating cylinder then raised too fast. This resulted in culling out approximately 40 per cent of the arms from excessive splitting. A single crossarm was used up to a 700-ft. effective span, and double arms were used up to effective spans of 1,000 ft. unless wider horizontal spacing of conductors was necessary, when three-pole dead-end structures were used.

Previous tests on impulse insulation characteristics made by the engineering department of the Electric Bond & Share Company indicated that all conductors must be kept at a minimum of 5 ft. from a metallic ground and that the average flashover values of approximately 190 kv. per foot of length of crossarm and 168 kv. per foot of length of pole were the safe minimum values to assume for insulation calculation. This line was designed for a maxi-

Flat transposition of Northwestern Electric Co. requiring a minimum of 15-ft. horizontal spacing. Structural strength is represented in heavy guying and braced double crossarm construction



mum impulse voltage insulation to ground of approximately 2,100 kv., the impulse wave assumed to have ¼ micro-second crest with a tail reaching half-crest value in 20 micro-seconds. As this is the only line connecting Ariel with Portland, a liberal insulation safety factor was desired and normal suspension units were selected which had an impulse flashover value of approximately 1,160 kv. As the impulse flashover value of unguyed suspension structures was far greater than the 5-ft. conductor from a metallic ground, it was necessary only to balance the insulation on all guyed structures to this figure. For insulators deadending at a pole and jumpered around through two insulator string yokes, it was desirable, for maximum mechanical strength, to terminate guys as close to the strain yoke pole contact as possible. For insulation and structural strength, the point of guy contact was fixed at approximately 2 ft. from the strain yoke contact. Assuming from the test figure that the 2 ft. of wood pole offered impulse flashover value to the amount of 336 kv., it was necessary to supply the remaining insulation in the insulator string to balance the designed requirement of 2,100 kv. This left approximately 1,764 kv. impulse insulation to be supplied by the strain units, which is equivalent to a 12-unit string. This practice of placing the guys 2 ft. from the strain yoke contact was followed throughout the entire construction of the line.

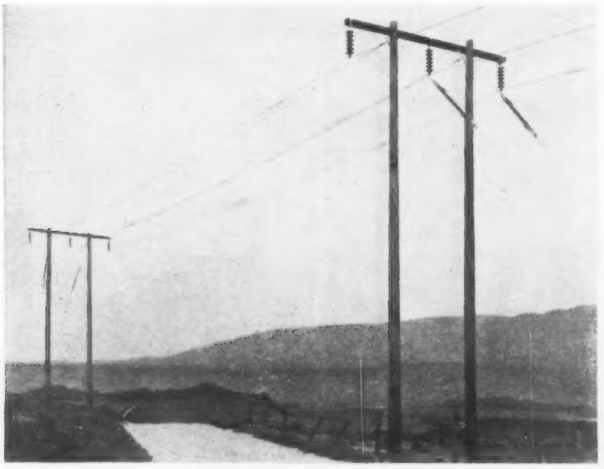
In consideration of structural strength, the second feature incorporated in the design, ample factor of safety was allowed against the heaviest condition of loading. The conductors were considered as uniformly loaded throughout their length for the load equal to the resultant of the dead load plus the weight of a layer of ice ½ in. in thickness, plus a wind pressure of 8 lb. per square foot on the ice-covered diameter. In guying, a maximum tension of 6,650 lb. was adopted, which allows a factor of safety of three over the ultimate strength of cedar poles with one conductor broken. This tension determined the final maximum sag of 12 ft. on a 500-ft. span at 120 deg. F. A minimum clearance to ground of 30 ft. was maintained throughout.

The line was sufficiently guyed to overbalance slightly the ultimate strength of the conductors. At deadends two 7/16-in., 18,000-lb. ultimate strength guys were used directly in the line of pull of each conductor. Horizontal pull exerted by the two guys equals 25,000 lb. and exceeds the ultimate strength of the conductor by 2,000 lb. In addition to deadend and angle guying, selected structures at intervals of approximately ½ mi. were side-guyed with one guy at each side in order to give greater stability. Ten-inch, four-way expanding anchors were adopted as standard for anchoring the guys.

The poles are designed to withstand the combined stress from their own weight, the wind pressure of 13 lb. per square foot on the pole, and the horizontal wind load of 8-lb. per sq. ft. over the projected area of ice-covered conductor.

From the above loadings, using a 65-ft. pole on a 500-ft. span, a unit fiber stress of 1,250 lbs. was reached, which gives a safety factor of 4 at the ground line of the pole, assuming the ultimate unit of stress to be 5,000 lb., not allowing for any brace action through the crossarms or side guys at ½-mi. intervals. Particular attention was given to angle and deadend positions so that the largest poles might be selected for these positions.

Tangent structures of the Puget Sound Power and Light Co. for highway crossing



Puget Sound Power & Light Company

Marketing the initial 60,000 kw. to be developed at Rock Island necessitated a transmission line from the development on the Columbia River near Wenatchee across the Cascade Mountains to the transmission network on the western slope which has Seattle for its load center. The initial line marks the first step in the construction of an elaborate 110-kv. network across the mountains which will eventually take care of the ultimate development of 150,000 kw. at Rock Island.

At the present time one 110,000-kv. wood pole transmission line connects the company's Deiringer power house near Seattle with Wenatchee. This line will be supplemented by the new 110-kv. line now being constructed from Rock Island to Skykomish near the summit on the western slope of the mountain, a distance of 82½ miles. As the need develops, this line will be extended later to the Beverly Park substation near Everett, Wash.

At the inception of this project, a preliminary field reconnaissance was made to determine the general route to be followed. Airplane photographs then were taken over the entire route from an elevation of approximately 12,000 ft., giving a resulting scale on the photographs of 800 ft. to an inch and showing the terrain approximately 4,000 ft. on either side of the center. These photographs were connected together to form maps on which the tentative location was projected. Although a field check was made, the final survey was made from the basis of the location determined on the photographs. The photographs were also found to be of much value by right-of-way men in interviewing owners.

Ten miles of the eastern end of the new line was constructed in the summer of 1930 to provide power for construction work on the Rock Island Dam. The remaining section is being worked upon from three points, employing about 700 men. As in the other cases of construction in the Northwest, clearing of the right-of-way was found to be a most difficult task. It is particularly so in this instance because future plans contemplate a second circuit over this route and a double width right-of-way is being cleared as part of the original installation. This double width right-of-way has been purchased for the entire length of the line except in the vicinity of Stevens Pass where the line crosses the summit of the Cascade Range. Here the topographical features of the narrow canyon prevented the use of this width of right-of-way and for approximately four miles in this vicinity the line will be carried on two-circut steel towers.

Wood pole H-frame construction normally will be used throughout the line and, with the exception of a few details hereafter described, design features of the line are similar to those already described. Conduc-

tors will be 4/0 hard-drawn stranded copper, except in the mountainous districts, where 336,400-circ.mil high strength aluminum cable, steel reinforced, will be used. Experience shows that excessive ice and frozen snow may be expected to form on the conductors in this 20-mi. mountainous section, and for this reason the high strength cable, tensioned for only 4,000 lb. maximum under heavy loading, will be used so that a very excessive ice and wind load may be carried without failure.

Six-unit suspension string insulators will be used on the wooden structure, but in order to balance the insulation an extra unit will be added to each string on the steel structure in both the suspension and string positions. Standard insulator hardware will be used throughout.

Several details of the wood pole construction used in this line are of interest. Three-pole, deadend and angle structures are used with a double crossarm. Departing from the usual practice of placing filler blocks or space bolts between the crossarms, these structures utilize galvanized steel 8-in. H-beam sections for this purpose, thus making a stronger and more durable structure. Guy strain insulators, approximately 9 ft. long, are made up from creosoted Douglas fir timbers and equipped with arcing horns. These will be installed on all guys on the H frame, their presence adding materially to the insulating effect of the wooden structures, which is often partially destroyed by grounding guys. No cotter keys are used on any of the hardware fittings, these being replaced by copper cotter rings arranged so that the ends are buried inside the cotter holes. This is done to eliminate one important cause of radio interference.

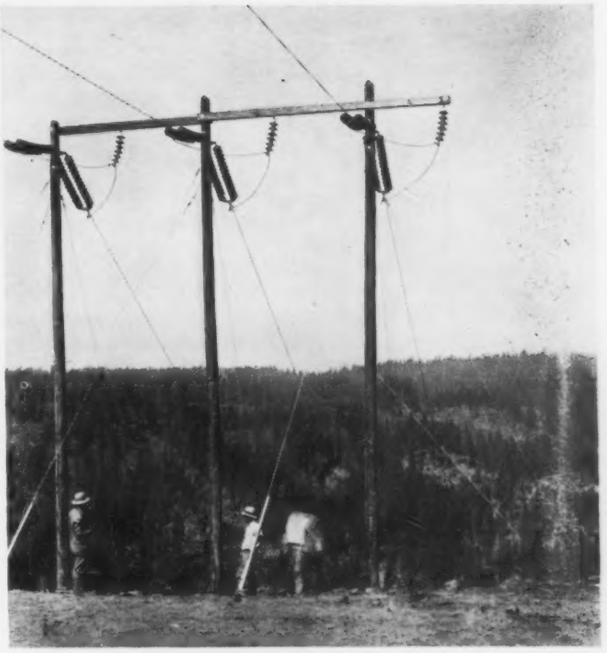
This original line will eventually form part of a 110-kv. transmission line loop tying in Beverly Park substation, near Everett, the White River power house, and the Renton steam station, three of the company's distribution centers, to Rock Island, so that power may be fed in the most economical manner. The three last mentioned stations are now connected by a 55-kv. network which will eventually be changed over to 110 kv. When the project is entirely developed five, and possibly six, 110-kv. lines will terminate the Rock Island development.

Pacific Power & Light Company

Construction methods employed on the transmission line of the Pacific Power & Light Company, which extends for 75 mi. across broken and mountainous country from Condit to Union Gap, permitted appreciable savings. Close coordination and good organization facilitated transporting and erecting the material and equipment, and the methods employed incorporate features of particular interest.

Details of the design features are very similar to those previously described in this article. The conventional H-frame wood pole supporting structures, flat conductor configuration, crossarm and suspension details, and deadend construction vary only in minor details which can readily be obtained from the accompanying table. Description of these features will be omitted in order to expand on the camp organization and material handling methods.

From ground and aerial surveys it was decided to locate the line straight from Union Gap, near Yakima, to Condit, regardless of the character of the country encountered. Work was started at the Yakima end and a construction camp set up for the clearing crew. When this crew had progressed far enough a second camp was set up for it and the crew moved to the second camp, relinquishing the first camp to a crew of diggers. When the clearing crew had moved into its third camp, which



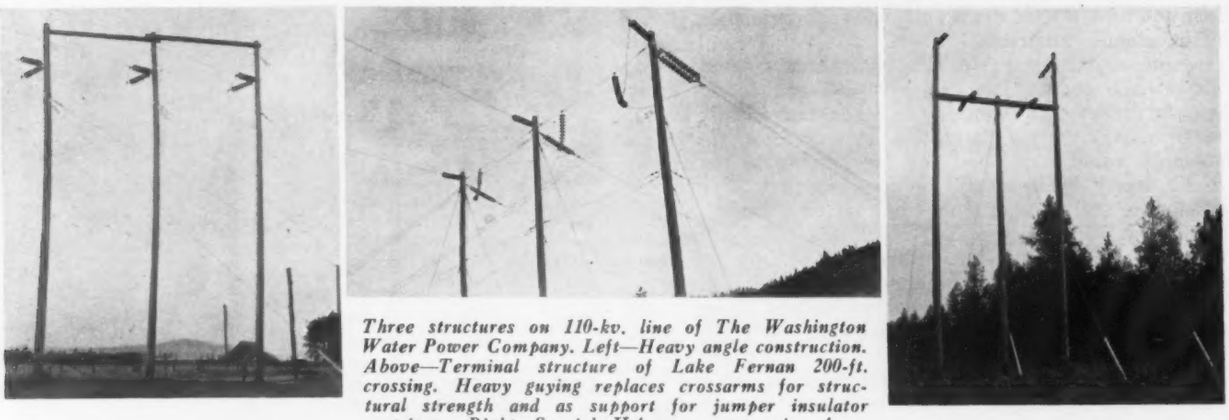
Clickitat crossing of the Pacific Power and Light Co. illustrates a type of long span structures used in wood pole construction. Proximity of guys to insulator mounting plates requires additional units in the insulator strings

had been established, the digging crew moved into the second, and a setting crew took possession of the first. From this point the clearing crew went on ahead as an independent unit, the other two crews moving up into the already established camps, and the wire-stringing crew taking possession of the first established camp. As the work progressed along the line, the rear camp was vacated, at which time it was torn down, loaded onto a truck, and moved to the foremost position to become the new camp of the clearing crew. With this arrangement a minimum number of camps was required and the further advantage of keeping a camp in one location for a maximum time by serving each successive crew was realized. In the operation the various crews each handled one particular line of work, sustaining the advantage of specialization in both men and equipment. Each camp was complete with a cook and helper, and served exactly the same menu as each of the others, obviating any possibility for a favorable comparison.

Meals were served for $1.20 per day, the only other charge being for laundry service, as required by the individual. The camp supplied everything but the men's personal equipment. First-aid medical and hospital service were provided on a split basis through the cooperation of a national hospital organization. This protection was extended to the individual regardless of working hours.

Camp organization having provided for a rapid means of progress, the organization of transportation facilities demanded similar coordination to maintain this advantage. Rail delivery of material was possible at only three points along the location, at which points material yards were established. From these points material was supplied to the location by means of a fleet of five 1½-ton Ford trucks for hauling miscellaneous material, two 1½-ton Ford trucks for hauling wire, and two larger trucks for bulk pole handling and other heavy service. One light high-speed truck served as the provision cart for all the camps.

At the material yard a truck was loaded with all the material required for a given structure. The material



Three structures on 110-kv. line of The Washington Water Power Company. Left—Heavy angle construction. Above—Terminal structure of Lake Fernan 200-ft. crossing. Heavy guying replaces crossarms for structural strength and as support for jumper insulator strings. Right—Special H-frame construction for transposition

list was taken from specifications furnished to the yard superintendent by the engineering department. With all the material for a structure thus assembled at the yard in this manner, delivery at the proper location permitted immediate erection. The unit delivery system was found to be of great advantage and was used for practically the entire length of the line. The transportation superintendent traveled up and down the line locating possible points of delivery and marking with small signs along the road the points where drivers should leave the road to deliver their material to certain structures. The maximum haulage distance encountered was 48. mi., the average being about 25 miles. Several specially constructed roads were necessary, but the right-of-way itself served as a road for a major portion of the construction.

The Washington Water Power Co.

Extending approximately 70 mi. from the East Side substation in Spokane to Bunker Hill and Sullivan substations at Kellogg, Idaho, The Washington Water Power Co.'s 110-kv. transmission line through the Coeur d'Alene district in Idaho provides an interesting symposium of wood pole structures.

Characteristics of the line itself are similar to those previously described, it being a single circuit 110-kv. line of stranded copper conductors carried on wood pole structures. The line is designed for 1,600,000 lightning impulse voltage and particular attention has been paid to maintaining this insulation value and decreasing radio interference.

Construction was carried out from four camps, each camp being equipped with one tractor and three trucks. The right-of-way was cleared for a distance of from 60 to 160 ft. Wire stringing and pole setting was done with tractors except for a 6-mi. distance where all poles had to be hand piked. Pole setting was facilitated by the use of a gin-wagon, the front of which was fastened to the tractor in such a way that it could be easily moved and spotted at the holes. Tackle consisted of $\frac{3}{8}$-in. cable with 8-in. steel, double-sheave blocks operated from a hoist mounted on the back of the tractor. With this equipment 42 poles were set in an 8-hr. day with a six-man crew.

Features of particular interest on this project are the design of the structures, the use of a ground wire, and the provisions made to prevent radio interference.

Ten separately designed structures were utilized to accommodate the requirements of the line. Detailed description of each of these structures is given at the end of this article but a discussion of general design features will enable a clearer appreciation of the transmission line practice of this company. As two- and three-pole wood structures are used throughout the entire line, all structures were carefully designed to take advantage of the impulse insulation value of 5 ft. 3 in. of crossarm or the equivalent length of a cedar pole. In cases where it is impossible to obtain the wood insulation, the number of insulator disks has been increased to maintain this insulation. A ground wire is installed on each pole for the purposes of protecting the pole from being split in case of direct strokes of lightning or insulator flashover, and to ground an overhead ground wire if it should be installed at some future date. On all two-pole structures the ground wire is run the full length of the pole, being fastened at the top to a split bolt and at the bottom by being wrapped twelve times around the pole butt. This wire is omitted on certain of the H-structures carrying angles because the insulator string might swing through an angle far enough to decrease the distance from the conductors to the ground wire to an amount which would be less than the equivalent impulse insulation of 5 ft. 3 in. of crossarm. On the three structures hereafter described as types "L," "M," and "N," the ground wire is run across the crossarms joining the tops of the three poles so as to protect them from direct lightning strokes. However, to avoid passing the ground wire near the insulator bolt through the bolt, the ground wire is connected directly to a guy rather than run down the pole. Where it is necessary to place the guys directly under the insulator I-bolt in order to secure the necessary pole strength, the number of insulator disks per string is increased in order to compensate for the insulation value of the wood which is lost.

The flexibility with which wood pole construction can be adapted to topographical requirements is illustrated in the accompanying photographs. Transpositions can be effected in a number of ways, none of which require additional width of right of way. Cross-arm construction can be made to conform readily to angle requirements and structural specifications.

In the following description of the various structures it is evident that guying has been given particular attention in the design. Where two or more guys originate from the same point on the pole, common strain plates have been used, such points being so placed as to give maximum strength to the structure as a whole as well as maintaining the impulse insulating value of the wood.

Representative Structural Specifications

LAKE FERNAN STRUCTURES—2,900-FT. SPAN

Three 55-ft. butt treated cedar poles set on 30-ft. centers were used for one end, the other end requiring poles 55, 60 and 65 ft. long. Poles were set 7 ft. in ground and guyed with 2,100 ft. of guy cable in 16 guys. Cross-tie guys between poles were placed 23 ft. and 55 ft. 6 in. above the ground. Three double strain strings of eleven units each, three eleven-unit suspension strings, and three eleven-unit single strain strings were mounted at each terminal. Conductors terminated at the pole on an eleven-unit strain string jumpered through a similar suspension string to the span suspended on the double strain string. Suspension insulator strings were carried on the upper cross-tie 8 ft. from the pole center line, giving horizontal spacing of 30 ft. A copper ground wire from the top to the base of each pole is installed, the wire being wrapped twelve times around the base of the pole.

DEADEND STRUCTURES

Two 55-ft. butt treated cedar poles set on 10-ft. 6-in. centers to a depth of 7 ft. in the ground are used. Crossarms consist of two 22-ft. crossarms mounted with fir spacer blocks at the center and outer ends of the arms. Poles project 4 ft. 9 in. above the top of the crossarm, line guys being attached above the arms at a minimum of 12 in. to the near edge of the strain plates. Four guys per pole are used, minimum clearance between crossarm and nearest swing point of conductor being 3 ft. Two side guys per structure are attached 5 ft. from the top of the crossarm to the center line of the strain plates. Side guys enter ground 38 ft. from center line of pole and line guys enter ground 45 ft. from center line of pole.

When these structures are used for angles, specifications are as follows:

Deflection angle 0-7½ deg., as detailed.

Deflection angle from 7½-20 deg., offset crossarm 1 ft.

Deflection angle from 20 to 28 deg., offset crossarm 1 ft. and add guy 8 in. below crossarm.

Deflection angle 28-42 deg., offset crossarm 2 ft. and add guy 8 in. below crossarm and add one insulating unit per string.

Ground wire on each pole applied as before.

TYPE "H" TANGENT STRUCTURES

This structure requires two cedar poles, 55 ft. long, butt treated, set 7 ft. deep on 10-ft. 6-in. centers. A single 22-ft. standard fir crossarm is placed 21 in. from the top of the pole, to which are attached three 6-unit insulator strings giving a conductor spacing of 10 ft. 6 in. These structures are normally not guyed, but if guys are required they are attached a minimum of 8 ft. down from the top of the crossarm to the center line of the strain plates. A copper ground wire runs down each pole from the top to the butt, where it is wrapped twelve times around the base of the pole.

TYPE "H" STORM STRUCTURES

These structures are similar to the dead-end structures previously described except that insulators consist of suspension strings of 6 units each. Four line guys per pole attached to strain plates immediately under the crossarms and carried to the ground 45 ft. from the base of the pole are used. One side guy per pole is attached so that the minimum spacing from the strain plates to the top of the crossarm is 6 ft. 3 in.

TYPE "J" ANGLE STRUCTURES—FOR SMALL ANGLES

These structures are similar to the type "H" structures except that 10-in.-top poles are used. Seven-unit insulator strings are mounted on the crossarm with the two outside strings carried on angle-brackets which put the insulator clip 19½ in. below the top of the crossarm. The crossarm is offset 1 ft. Upper side guys are placed so that point of attachment to the pole will give a minimum of 4 ft. 6 in. clearance from the conductor. Ground wire installed as previously described.

TYPE "L" ANGLE STRUCTURES—FOR MEDIUM ANGLES

Structures consist of three butt treated cedar poles, 55 ft. long with 8-in. tops set 7 ft. deep on 10 ft. 6 in. centers. Two 6-ft. fir crossarms are overlapped across center pole and bolted together with 9-in. spacer blocks between. Suspension strings of seven units each are mounted one on each pole by means of angle-brackets. Angle-brackets on poles must be a minimum of 4 ft. 3 in. down from closest point of strain plates to upper point of the bracket, giving the bracket 12 in. clearance from pole to insulator clips. Structures are guyed with double side guys.

TYPE "M" ANGLE STRUCTURES—FOR HEAVY ANGLES

Three 55-ft. butt treated cedar poles with 8-in. tops are set 7 ft. deep with spacings which vary from 10 ft. 6 in. to 12 ft., depending upon the angle. From 0-24½ deg. angles poles are set on 10-ft. 6-in. centers, increasing this distance to 12 ft. for angles between 53 and 60 deg. For the minimum spacing only one 22-ft. crossarm is used. For other spacings two 16-ft. crossarms are overlapped across the center pole with 9-in. spacer blocks at the ends. Guying also varies with the angle to be accommodated. The first guy is placed on the top of the outside pole with a strain plate immediately under the crossarm, a minimum of 4 ft. 3 in. clearance being specified. The second guy is placed with the first, the third being mounted on the center pole below the point of attachment of insulator string, with the same clearance requirements. The fourth guy is placed in a similar position on the inside pole. Insulator strings are mounted directly to the poles and a copper ground wire is carried across the top of the crossarm but not down to the pole, the ground wire being attached directly to the guy.

TYPE "N" ANGLE STRUCTURES—FOR HEAVY ANGLES

These structures used three 55-ft. butt treated cedar poles set to accommodate the line angle. Twelve-foot spacing is used for angles between 42 and 60 deg., this spacing being increased to 14 ft. 6 in. at the maximum angles of 85 to 90 deg. Two 16-ft. crossarms are overlapped on the center pole and bolted together with spacer blocks, as previously described. For the heavier angles two 6-unit suspension strings are mounted on each pole 6 ft. from the top. One guy is provided in the reverse direction from each approaching conductor and one side guy is provided for each pole, making a total of nine guys. The minimum clearance of 4 ft. 3 in. is maintained between strain plates and through-bolts of insulator strings. On the outside pole one guy is mounted just under the crossarm and two are mounted below the insulators. On the second and inside poles all three guys are mounted below the insulators. Ground wire is carried across the crossarm but not down the pole, it being attached to the guy.

TYPE "O" LONG SPAN STRUCTURES

Three poles 55 ft. long, with 8-in. tops, set 7 ft. 6 in. deep. Crossarms made up of three fir timbers 6 in. x 6 in. x 16 ft., and one crossarm 5½ in. x 7½ in. x 22 ft., assembled to give double arm construction with long arm projecting to one side to carry the insulator string for the jumper loop on the side of the structure. Poles set 15 ft. apart. Higher crossarm timbers mounted 9 in. from top of arm to peak of pole, and lower pair mounted immediately under upper pair. Insulators, six strain strings 11 units each, three suspension strings 6 units each for jumper loops. Strain strings mounted directly to poles 3 ft. 9 in. below top of upper crossarm. Suspension strings carried on cross arms 5 ft. out from center line of poles. Ground wires up each pole, but not across crossarm, carried to butts of poles as mentioned earlier. Six line guys and two side guys; eight anchors. All guys attached to poles with strain plates directly under point of attachment of insulator strings.

Let's Promote Christmas This Year

If Your Town Hasn't an Annual Christmas Lighting Contest, Promote Yourself Some Business by Promoting the Contest

Above—San Francisco constructed a stage in its mid-town Union Square, sponsored nightly broadcasts. The square always was packed during the program. A tall monument was transformed into a tree nearly as high as the building to its rear, decorated with tin scrappings from a can manufacturer

NO HAMLET lacks a public-spirited citizen who, annually at Christmas time, festoons his house and trees with lights and tinsel. But not in every town is a concerted drive made to enlist more families in this idea. Apart from its primary purpose—that of beautifying home and community at the holiday festive season—to the contractor-dealer it means that he supplies and perhaps installs the decorations, the central station gets ad-

Below—Hollywood could be expected to go modernistic. So it did. The inset shows the painted cone attached to each lighting standard to create an effect of modernistic trees; tubular colored celophane cylinders replaced the usual glassware

Above—Ogden, Utah, held a competition for building decorations and was surprised by a wholehearted response. Second prize was won by the First National Bank, with a Christmas tree outlined by lamps applied to the building face

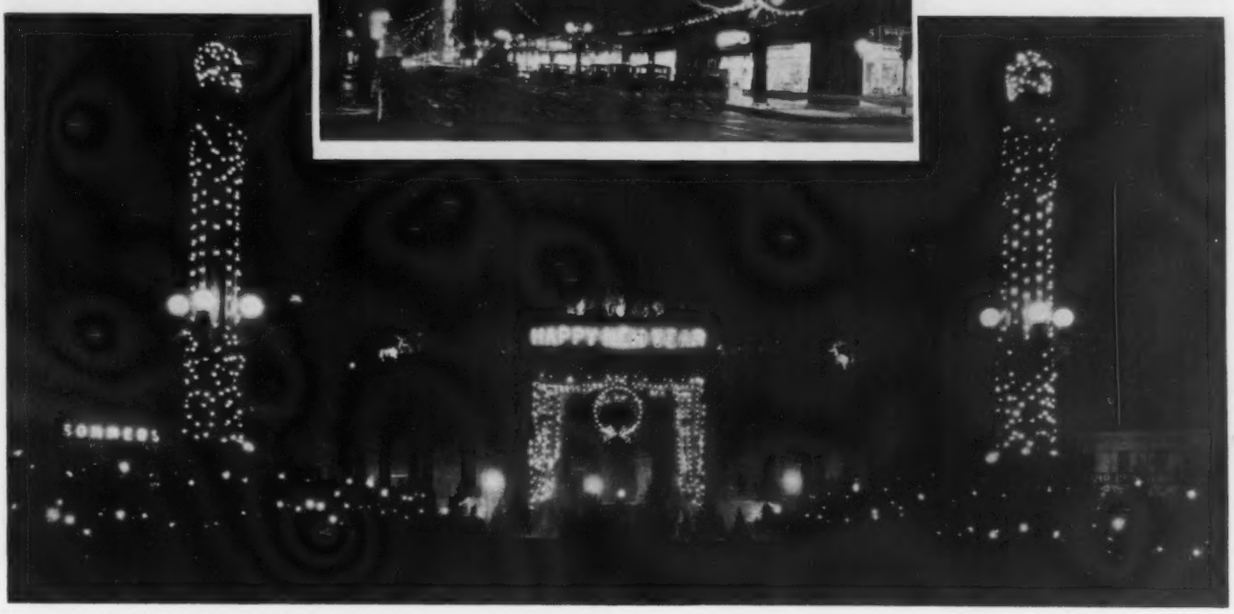
ditional load; and the various agencies interested in the drive gain publicity for themselves and for the town.

Some dealers, sensing these possibilities early, have undertaken to sell the city council (or whatever governing body corresponds), the civic clubs and the newspaper on the idea. Usually, these are only too willing to cooperate, especially under a joint-sponsorship plan. In some towns radio stations have been enlisted to broadcast short but frequent announcements. At the most, only a day or so is consumed in promotion but the results of that day's work are reflected during the entire season.

Next, the dealer, by displays or advertising, should let his customers know that he sells necessary supplies and that he will advise on decorative schemes. Usually, merchants can be enlisted to donate prizes for the best displays in various classes; this constitutes good but inexpensive advertising. Whatever the cost of promotion to the electrical dealer, he should be repaid over and again in profits from the sale of lamps, wire and other supplies. And customers who come into the store to buy supplies may be interested in a neat display of Christmas appliances for gifts to family or friends.

By taking the initiative the contractor or dealer who sells this decorating idea may also gain a contract for lighting the main streets or a central Christmas display. When the city council is not able to pay the entire bill, the merchants usually assist with contributions enough among themselves to meet the cost. Yes, a little promotion by a live dealer will add considerable business to his books.

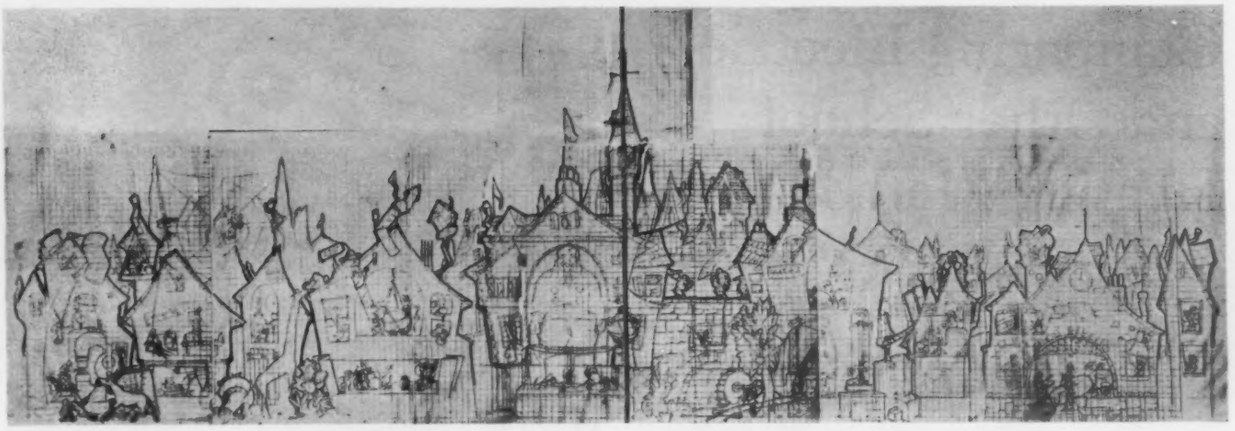
Below—One entrance to Denver's civic center, showing the Greek Theater arcade and the peristyle towers. Inset shows 16th St. in Denver. Seven and a half blocks were so decorated and were kept lighted until midnight from Thanksgiving eve until New Year's night.



Above—Stanley D. Decker, Salt Lake City, won the grand sweepstakes prize among homes in his city with this highly original "candy house" motif. Plaster board figures, painted to resemble the legendary characters known in childhood, were lighted by concealed spots. A sign on the right bears the words, "Stan and Naomi Candy House" while two large candy canes outline the eaves

Below—Residential winner in Phoenix, Ariz. competition was the home of A. Carraro, located on a hill in the desert about 5 mi. from Phoenix. Two hundred and twenty-five colored lamps were used to decorate the castle and grounds and now have been installed as a permanent decoration, burning every Saturday and Sunday night

Below—As manager of the Los Angeles branch of Graybar Electric Co., Harry L. Harper took it upon himself to see that Christmas decorating went forward. So he spoke to a score of his neighbors in Beverly Hills and influenced them to decorate their homes. Some of the results are pictured below. In the lower right-hand picture, Mr. Harper and his daughter stand beside their own tree



This is how it starts. A drawing to scale was first made and the builders of the displays work from this. Displays are rotated among stations in different cities so that something new is offered each year

It's Good Business

IN NINE Western cities, the Shell Oil Co. has been giving children a Christmas treat with a huge "Toyland" display every year since 1923. Each year the display is different and more spectacular as more of the parts are electrified. Nursery rhyme and toyland characters move in approved story book fashion, some of them talking by means of electric recordings.

The central figure is a huge Santa Claus who moves his head and rolls his eyes in lifelike fashion. A costumed attendant roams through the throngs in front, his coat concealing a microphone arrangement by which the spoken wishes of the children are relayed to a hidden worker; this man answers all questions and approves all wishes through a speaker in Santa Claus' mouth. Thus the childhood hero also seems to speak—and he knows a lot.

Each construction job usually requires a crew of 30 men for more than three weeks, most of the work being done at a studio. Naturally, the set is costly, but the results are exceptional. The San Francisco display was responsible for the sale of 16,400 gallons of gasoline in one day, the regular crew of six being increased to 20 for the 30 days' showing. In the company's central district, gallonage increased 406 per cent, and some of the increase is retained each year. So it's good business.

Right—The fabrication of the "Toyland" involves no little work and considerable ingenuity. Scenes are made just as in motion picture work, but they must be rehabilitated and repainted each year. The central figure, Santa Claus, is made as perfect as possible so that no child will perceive some flaw and suffer disillusionment

Left—As the display looks from a distance. The immense crowds which gather, not only of children but of adults, attest the novelty of the idea and also the advertising value. Shell Co. officials estimate that 500,000 kiddies see these displays each season

Comparing Electric and Other School Heating Methods

Second Article Extracted From a Thesis Prepared for a Master of Science Degree in Electrical Engineering, and Presenting an Unbiased Scientific Viewpoint on School Electric Heating Problems

By PROF. H. WARD AUSTIN*
Marin Junior College, Kentfield, Calif.

HAVING considered the three methods of estimating the cost of electric heating of school buildings (see ELECTRICAL WEST, Sept. 1, 1931, p. 137), it is important that the method chosen be applied to an actual comparison of electric heating cost with heating by some other means commonly employed.

In order to compare the cost of electric school heating with the cost of other forms of school heating, the following tables on installation and energy costs of various heating systems are presented:

INSTALLATION COSTS OF HEATING SYSTEM FOR A 10 EQUIVALENT CLASSROOM BUILDING (1)

System			Cost per Equiv. Classroom
I	Central heating direct radiation (oil fuel)	(2) $5,500	$550
II	Unit water boiler (gas fuel)	4,000	400
III	Gas radiators	2,000	200
IV	Jacketed stove (coal fuel)	2,000	200
V	Hot air vento-coil heating (oil fuel)	8,500	850
VI	Electric heating (direct radiation)	(3) 3,125	312.50

(1) Data for System I to VI from "Heating and Ventilating Fresno City Schools." F. W. Hubbard thesis, University of California, May, 1926, p. 57.

(2) Slightly higher than McLure found the nationwide average to be. Ph. D. thesis, Columbia University.

(3) Average cost of installation $312.55. Cost of installing electric heating in a 10 equivalent classroom building = 10 × $312.55 = $3,125.50.

To facilitate a comparison of the installation costs of the various heating systems considered, let us assume the cost per equivalent classroom of installing electric heating as 100 per cent. On this basis the relative cost per equivalent classroom of installing the other systems is shown in the table below. It is to be noted that System V provides both heating and forced ventilation. It is included to show the relative cost of the additional features that this system provides.

By reference to the tables it may be seen that the cost of installing a system of gas radiators is only 3/5 that of installing an electric heating system. However, a heating system depending on gas radiators is not practicable in all parts of California because of the wide variation in fuel cost.

The installation cost of a jacketed stove is only 3/5 that of an electric heating system, but the lower cost of the former is offset by the extreme inconvenience of heating by such a method. Direct radiation utilizing steam with oil fuel is seen to have an installation cost 1¾ times that of an electric system.

The cost of installing the unit water boiler system with gas fuel is 1¼ times that of installing an electric heating system. In conclusion, it may be stated that in so far as installation cost is concerned, electric heating has a decided advantage over other heating systems offering an equivalent service.

By reference to the large summary table in the last article (ELECTRICAL WEST, Sept. 1, 1931, p. 138), the average cost of electric energy is seen to be $66.69 per equivalent classroom per year. Comparing these figures with those in the survey made at Fresno showed the cost of electric energy to be approximately six times as high as that of oil, utilizing direct radiation, two and a half times as expensive as gas, and three times as expensive as oil utilizing a hot-air forced mechanical ventilating system. A similar comparison of the cost of a heating system using electrical energy with the cost of heating systems using other fuels in southern California shows the electrical energy cost to be approximately five times as great as that of direct steam, two and a half times as expensive as gas radiators, and two and a half times as expensive as the hot-air plenum system.

It may be said, then, that the cost of electric energy varies from two and one half to five or six times the cost of fuels used in other types of heating systems.

Sample Calculation—To give a more definite idea of

Main building of Marin Junior College, Kentfield, equipped with baseboard type of electric heaters, the first installation of its kind

COMPARISON OF INSTALLATION COSTS OF HEATING SYSTEMS FOR A 10 EQUIVALENT CLASSROOM BUILDING

(Electric heating installation cost used as 100% and unity)

System		Cost in per cent	Proportionate cost
I	Central heating, direct radiation (oil fuel)	175.9	1 3/4
II	Unit water boiler (gas fuel)	128.2	1 1/4
III	Gas radiators	63.9	3/5
IV	Jacketed stove (coal fuel)	63.9	3/5
V	Hot air vento-coil heating (1) (oil fuel)	271.8	2 3/4
VI	Electric heating	100.0	1

(1) Provides both heating and forced mechanical ventilation.

* The first article from this thesis appeared in ELECTRICAL WEST for Sept. 1, 1931, p. 137, under the title "School Heating on a Degree Day Basis."

the cost of operation of an electric heating system as compared with a system of direct radiation utilizing steam with oil as a fuel, the following sample calculation is presented, based on the maximum costs brought forth in this report. Let us assume:

Ten equivalent classrooms (volume)	100,000 cu.ft.
Installed electric heater capacity (average of larger schools studied)	116 kw.
Average rate for electric energy per kw.-hr. The cost of energy for the seven heating months is then obtained according to the method devised	$ 0.023
116 × 40.7 × $0.023 × 7 =	$760.00
Cost of fuel oil per year for ten equivalent classrooms (System 1)	
10 × $12.98 =	$129.80
Using six-to-one as the probable maximum ratio of the cost of electricity as compared to the cost of oil, an energy cost which checks that determined by the kw.-hr. per kilowatt installed method is secured,	
$129.80 × 6 =	$778.80
Cost of installation of System 1	$5,500.00
Cost of installation of electric heating	
10 × $388.00 = $3,880.00	$3,880.00
Interest	6%
Maintenance—	
Steam	3%
Electric Heating	1%
Labor saving of $200 per year on the operation of the electric heating installation.	

Using the above data, the following comparison is obtained:

COMPARISON OF MAXIMUM YEARLY OPERATING COST FOR ELECTRIC HEATING AND FOR SYSTEM 1 OF FRESNO SURVEY

	System 1— Steam (oil fuel)	Electric heating system
Interest	$330.00	$232.80
Maintenance	165.00	38.80
Labor	200.00	
Fuel	129.80	778.80
Total operating cost (per year)	$824.80	$1050.40*

FEASIBILITY OF ELECTRIC SCHOOL HEATING

East of the Rockies only a few communities, where local conditions make low heating rates available, have attempted major space heating on any scale approaching the application in the West. It is doubtful whether communities in the East or in other mild climates can profitably use electricity for major space heating except as an auxiliary to a heating system of some other type used during peak cold periods or for individual room heating. On this subject more will be given later.

Since electric school heating involves many factors not applicable to general electric air heating, such conditions relative to eastern or far north regions do not present a sound economic consideration of the problem of electric school heating.

The value of a load to a power company is largely determined by the annual return per dollar invested in the service facilities needed to furnish it. The characteristics of the load determine the investment. A load which does not come on during peak load periods requires less investment than one that does. The less investment needed to supply a certain load in proportion to income from it, the higher will be the rate of return per dollar invested, and the lower the rate which can profitably be charged for the service.

The average schoolroom must be warmed to a temperature of 68 deg. F. by 9:00 a.m., while in junior colleges and universities, eight o'clock classes are in vogue in many instances.

Inspection of the daily load curve showed that any increase in or ability to pick up school heating would help materially to fill in part of the large gap that occurs before the morning peak load. The practice in 26 schools investigated is to turn on the heat from 6 to 7 a.m., depending on outside temperature conditions. With the exception of eight or ten extreme days, the heat may be turned on "medium" or to "low" by 9:00 a.m. and the high heat will not be required at any later hour in the day.

Under conditions shown under composite daily load curves of any power company at a 45 per cent load factor, the school load will be seen to be a still more desirable one from the utility standpoint.

It will be seen that the school load is largely an off-peak load. In view of this fact, public utilities might well afford to give a special rate which the schools at present do not enjoy.

During the summer and fall months when, due to the temperature, little or no heat is required, the utilities enjoy a large pumping load in California. Late in the season, as the pumping load drops off, the ideal condition can be fulfilled by having a heating load, a load of unity power factor, to fill the gap which would be left by the decrease in the pumping load. Of course, there will be some overlapping but at the time of this overlapping the spring runoff will be taking place in nearly all of the hydro installations. A large number of the hydro plants are stream flow plants, so that unless they run full capacity during this runoff period there is no opportunity to utilize much of this potential power. Many of our power installations could not utilize storage facilities even if they were available, because of riparian water rights farther down the stream.

At first thought it would appear that a heating load combined with a diversity factor such as the pumping load introduces, would offer a way of lowering the cost of energy for heating. The heating load, however, would be concentrated in the cities if confined to house heating, or would be more widely distributed if confined to school heating, with the result that the transformers and other equipment used to distribute energy to the pumping plants must be idle during the off season, and duplicate apparatus be installed near the various heat loads. This necessitates large duplication of distribution apparatus in order to realize the income from the same available kilowatt. So, although a diversity factor exists in so far as the utilization of the energy is concerned, it does not exist from a distribution standpoint and therefore only a part of its value may be realized by both the individual and the utility supplying the power.

Another thought has lately been developed in respect to electric heating which will bear further investigation. This is that where the temperature difference is so great as to make uneconomical under existing rates an electrical basic heating installation, the electric heating can be provided as an auxiliary and peak heating equipment to another type of basic heating plant. Thus a minimum heating installation, utilizing some other fuel, can be installed to carry the basic heating load during the heating season. On extraordinarily cold days the auxiliary electric heating can be turned on to take care of beyond average conditions.

Under such a plan the electric heating equipment's flexibility is retained, and individual classrooms may be heated without the entire plant being in operation, such as is desirable for night classes. In early fall and late spring when the entire heating plant need not be used,

* EDITOR'S NOTE—In calculations of comparative costs some other factors not considered by Prof. Austin are now brought into the comparison. These include boiler, explosion and fire insurance, rental value of space occupied by heating systems, foundations and excavation costs, cleaning, painting and decorating. These usually balance the equation on costs and are legitimate considerations.

the electric heating equipment for a few hours a day bridges the gap.

Such a heating method offers very attractive load characteristics to the power company also. The same early morning use to boost the temperature before school opens with subsequent turning off at the time the morning peak on the system begins, still obtains. The heating season, as respects electricity, will be continuous for a longer period of time than that of the basic heating installation.

In one school in which electric heating was installed and proved costly to operate because of the great temperature difference existing in that locality, a steam heating plant was recently installed. At first it was planned that the electric heaters be removed but they were left in place. Their use as an auxiliary has proved the feasibility of such a plan, even for an original installation of that type.

A final article extracted from this thesis will go into the subject of ventilation and its relation to school heating by electricity. Likewise the results of some actual heater tests will be concentrated into a few charts. Summary and conclusions will conclude the work.

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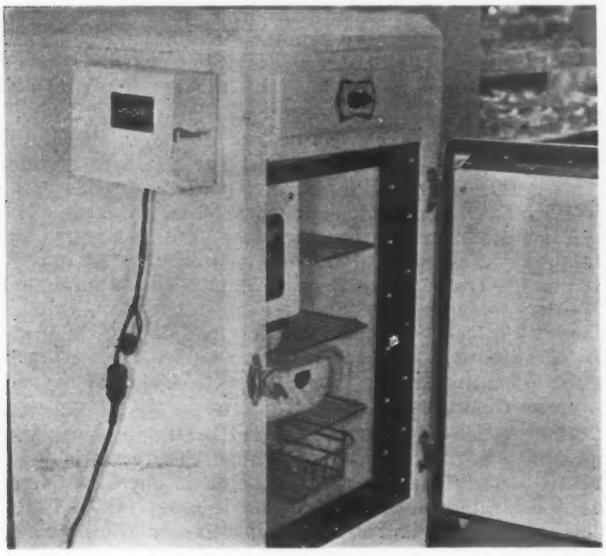
A Quarter a Day Keeps the Iceman Away

ALTHOUGH electric refrigeration sales in the West, and on the Pacific Coast in particular, are record breaking in most instances (chiefly because of the intelligent merchandising by local bureaus tying in with the national refrigeration drive, as reported in ELECTRICAL WEST, Oct. 1, 1931, p. 188) most authorities look for a slight seasonal decline in sales because of the approach of winter. However, some of the larger merchandisers, chiefly department stores, have joined in a novel selling plan which is expected to hold sales up to the present level by opening a new class of prospects.

Under this plan, the refrigerator customer signs a regular purchase contract, as under the conventional plan, but instead of making monthly payment of what seems to be a large amount of money, she places 25 c. each day in a special meter attached to the refrigerator. The 25-cent deposit will operate the refrigerator for 24 hr., and unless another quarter is forthcoming at the end of this period, operation will stop. So, if the customer has been operating the machine the full month, there will be $7.50 in the box. If the machine has stopped, the customer must make up the difference, because the plan is actually a deferred method of paying monthly installments of $7.50 each. Once each month the dealer collects the deposits and credits the amount in the meter to the account of the customer. When the refrigerator is paid for, the meter is removed and a bill of sale issued.

Meterice box attached to refrigerator. Indicators show number of quarters paid in advance and total since purchase



Two similar plans are in operation, the Meterice plan and the Electro-Save plan. Only the former has become widely used, however, and the licensing company is officed in Los Angeles. This company, through agreement with the dealer, furnishes its patented meter, a small, compact unit which may be placed either on the top or on the side of the refrigerator and inserted in the line from the house meter to the motor. As many as eleven quarters may be deposited at one time in this meter, a recording device showing the number of deposits. This obviates the danger of the housewife failing to have the necessary piece of money on any one day.

The Platt Music Co., of Los Angeles, a chain of approximately 30 stores, installed the Meterice plan in the summer of this year and for a period of 90 days made a detailed record of their expenses, including advertising costs, selling costs, collections, repossessions, and other information necessary for them to determine whether or not the Meterice plan was practical. During this time they sold several hundred refrigerators with Meterices attached and found that at least 90 per cent of their customers had paid their quarters in advance and that only one customer in this period was behind in her payments. Later, The May Co., also of Los Angeles, undertook to sell in this manner and placed three advertisements in a morning newspaper. Eighty units were sold on the opening day of the new plan. In the first month the store sold $102,000 worth of refrigerators as compared with a total business for the preceding year of $74,000. Since that time they have been advertising regularly on a smaller basis and this has been sufficient to keep sales up to an average of about $7,000 per day.

Their experience has been that once they have placed a refrigerator in a home under the Meterice plan, the salesman can immediately interest most of the people in that neighborhood. The May Co. paints its name on the face of the meter with a stencil; this leads to many inquiries from people who wish to purchase a refrigerator under the plan.

The Los Angeles stores have required no down payment, the refrigerator being delivered and installed upon the first day's deposit. Their theory is that once an electrical refrigerator is placed in a customer's home, it is almost impossible for her to do without it. Thus the company makes it as easy as possible for her to arrange for the first installation, without the hesitation encountered when a large down payment or heavier outlay is necessary.

Because of the appeal of the plan, which brought hundreds into the store, the May Co. salesmen were able to sell 30 per cent of the refrigerators along conventional lines; during that first week $30,000 worth of refrigerators were sold under the straight contract plan and $72,000 worth under the Meterice plan. As a rule, the customer buys the cheaper refrigerator, the average sales check being approximately $190. This indicates that those affected by the plan are those in that fringe class that heretofore have wanted such a convenience

but have hesitated because of the demand for a larger first payment than they wished to make. The small sum required each day is more like buying ice or renting the refrigerator and is seldom noted. It also allows the housewife to budget her cost day by day.

In San Francisco The Emporium, and in Oakland H. C. Capwell Co. are also using this plan. However, both stores require a down payment of $10 as in a sale by other methods. The effect of this down payment requirement is slightly noticeable, for while The Emporium has increased its sales well over 100 per cent since the adoption of the plan, the increase has not been so phenomenal as that in The May Co. The Emporium also limits the price of refrigerators purchased under this plan to approximately $200.

Other stores on the Pacific Coast and as far east as Philadelphia are now using this plan.

In installing a refrigerator under this plan, the customer is asked what is the most convenient time to have the collector call; the collectors then govern their visits accordingly. Collection costs thus amount to about 1½ per cent, while under other methods these costs run about 3 per cent. While advertising costs before were approximately 7 per cent they are close to 1 per cent under the plan.

It is rather too early to predict the success of these two plans in holding up refrigeration sales during the winter, but it is not unreasonable to assume that refrigeration sales will be greatly helped by their introduction. The plans have made electrical refrigeration seem obtainable to a larger group of people and have removed many of the former psychological deterrents to sales progress.

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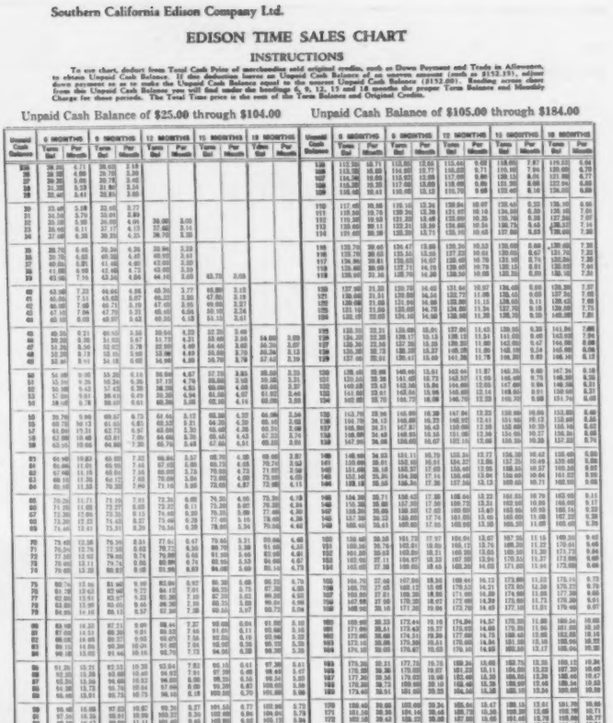
Taking the Terror Out of Time Payments

WHEN the sale has been made and it becomes time to work out the mathematics which will give the proper carrying charges and adjust the unpaid balance evenly over a number of months, the salesman usually begins to do a serious and suspicion-arousing amount of figuring on a scratch pad, much to the consumer's distrust. When called upon to explain all of the steps taken and the reason for them he is sometimes at a loss, explaining simply that such is the company's time-payment plan. Often, too, he makes an arithmetical mistake which is embarrassing to explain away.

The Southern California Edison Co. Ltd. first endeavored to meet this situation by issuing to all of its salesmen cash and term price sheets on the appliances they sell. This required a great number of sheets, through which the salesman had to thumb to find the correct one relating to the particular type of range he was offering. Another difficulty came from the number of revisions in prices which were necessary from time to time and the necessity for changing of sheets. Furthermore, the terms were based on six, twelve and eighteen months' periods and caused confusion if the customer wanted a period of terms in between, say fifteen months.

Later, another system was devised employing a factor by which to multiply the unpaid balance for a definite number of months. This made a very mysterious figure. It often took considerable explanation to a customer to convince her of its soundness.

With this experience back of the company, A. W. Althouse, assistant merchandising department manager,



Southern California Edison Company Ltd.

EDISON TIME SALES CHART

INSTRUCTIONS

To use chart, deduct from Total Cash Price of merchandise sold original credit, such as Down Payment and Trade in Allowance, to obtain Unpaid Cash Balance. If this deduction leaves an Unpaid Cash Balance of an uneven amount (such as $152.59), adjust down payment so as to make the Unpaid Cash Balance equal to the nearest Unpaid Cash Balance ($152.00). Reading across chart from this Unpaid Cash Balance you will find under the headings 6, 9, 12, 15 and 18 months the proper Term Balance and Monthly Charge for these periods. The Total Time price is the sum of the Term Balance and Original Credit.

Unpaid Cash Balance of $25.00 through $104.00 — Unpaid Cash Balance of $105.00 through $184.00

This chart removes psychological obstacle to sale closing

worked out a series of standard chart sheets with which he feels he has solved the problem. On one letter-size sheet of heavy index stock are given the terms and per-month payments for appliances ranging from $25 to $184. The charge is broken up into divisions representing six months, nine months, twelve months, sixteen months and eighteen months of term payments. With this chart it is easy to answer the question, "What will my payments be?" and it is unnecessary to do any mathematics in front of the customer. The method of using it is as follows:

The total cash price of the merchandise (and if it is a range the wiring price is included) is taken and the down payment and trade-in allowance are deducted. This gives the unpaid cash balance. If this deduction leaves an unpaid cash balance of an uneven amount, the down payment is adjusted so as to make the unpaid cash balance equal to the nearest unpaid cash balance on the sheet. In the left-hand column on this sheet are listed unpaid cash balances beginning with $25, and running by even dollars to $184. If the unpaid cash balance amounts to, say, $152, the total term balance including the carrying charge is given in the column next to this figure. For six months this is $161.58, and adjoining this in the next column is the per month charge of $26.93. Similarly, the term balance for nine, twelve, fifteen and eighteen months can be derived at a glance from the chart in adjoining columns together with the monthly payment for each.

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CORRECTION—In ELECTRICAL WEST, Sept. 1, 1931, on page 133, in the article entitled "Heating Stock Water During Zero Weather," the water heating rate was given as ½ c. per kilowatt-hour. This should have been 1½ c. per kilowatt-hour.

Thomas A. Edison's Death Is Mourned Throughout the World

THOMAS ALVA EDISON passed to his final rest on Oct. 18 at his home in West Orange, N. J., leaving behind him a world bereft of its greatest inventive genius. To those of the electrical industry his loss means bidding farewell to the man upon whose achievements their own endeavors are founded.

It would be difficult to appraise the work of a man who has contributed so enormously to the progress of civilization, whose influence is so indelibly impressed upon American life.

Typically American his rise to achievement and fame from an unpropitious start in life. A descendant of Dutch colonists who settled originally in New Jersey in 1730, Edison was born at Milan, Ohio, Feb. 11, 1847, where he passed his first seven years. Three months of school at Port Huron, Mich., constituted his formal education. It is recorded that he owed much to his capable and cultured mother who showed interest in the early experiments with which he was constantly occupied. During his childhood he engaged in a number of small business ventures, including the sale of candy, vegetables and newspapers. The financial results of these enterprises were usually satisfactory, but no single accomplishment, however successful, ever ended his endeavors, serving merely as the stepping stone to something better.

Edison's earliest inventions were in the field of telegraphy. As a newsboy of fourteen on the Grand Trunk Railway in Michigan, he occupied his spare time in trying to find out how the telegraph worked. A station agent taught him the Morse code, and at the age when he might have been in college he was traveling throughout the East and Middle West acquiring experience, sometimes broke and on foot, and working intermittently for the Western Union.

While his main interest was still in telegraphy, Edison acquired one of the earliest of his more than 1,300 patents. This was for the Edison Universal stock ticker, and with it he started a market quotation service. He sold the device, incorporating the unison principle in general use today, for $40,000, though he has said he would have been satisfied with $3,000. In 1874 he invented the duplex, quadruplex, sextuple and multiplex telegraph systems, permitting a number of messages to be sent simultaneously over one wire.

Financed now to devote his time to further experiments, the inventor next turned his thoughts to the telephone. The first telephone had already been invented by Bell, but had failed on account of the faintness with which it reproduced the human voice and because of the extraneous sounds which came in on its wires from various causes. Edison's study of these difficulties resulted in his development of the carbon transmitter, and the telephone came into general use.

The phonograph appeared in 1877

THOMAS A. EDISON
1847 — 1931

during the period when Edison was still engaged with experiments in reproducing the human voice, and it alone has carried his name to the far ends of the earth. The Ediphone dictating machine was a later refinement of his earlier cylinder-record machines. The mimeograph and the microphone also were his.

The long series of inventions covering the generating, distributing, regulating and measuring of the electric current found its beginning in Edison's invention on Oct. 21, 1879, of the first practical commercial incandescent lamp. The romance of his success in this endeavor was relived two years ago during Light's Golden Jubilee, when homage was paid him by the entire world.

Then came devlopment of dynamos, underground conductors, mains, feeders, connection boxes, service switches, sockets, wiring devices, fixtures, meters and safety appliances. The building of the now historic Pearl St. Station in New York in 1882 to supply consumers with electric service for light and power from an underground system was the logical result of many of these inventions. There followed the production of a motor which would work from the general lighting circuit, and experiments with an electric railway.

Edison's next interest was in wireless telegraphy, leading him to the discovery of the phenomenon which covers the fundamental principle from which the radio tube was later to be developed. The motion picture camera with a continuous film appeared in 1891. The succeeding decade he devoted mainly to the development of electric machinery for milling and magnetic ore separating processes, cement manufacture and poured cement houses. He invented the fluoroscope for making examinations with the X-ray, and the nickel-iron storage battery. During the World War he was called upon to head an advisory board of civilian inventors to meet conditions of warfare on land and sea. The end of the war found him working on ways of combating enemy submarines.

In his later years Edison devoted much time to experimentation and research along purely chemical lines. With his close friends, Henry Ford and Harvey W. Firestone, he had been engaged for some time before his death in experiments with the production of a substance from certain American-grown plants for use in the manufacture of rubber. His plans in this respect did not contemplate commercial or competitive production of rubber in America; he merely foresaw that in case his country were ever isolated from the Orient by war she would be handicapped by lack of this essential commodity.

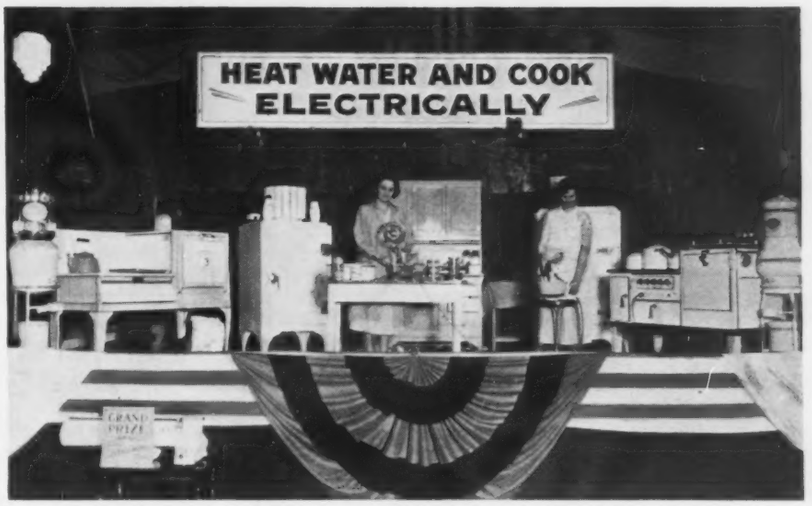
The modesty and friendly cheerfulness of this great man endeared him to all who knew him. Ever indifferent to practical remuneration for the fruits of his genius, he once was surprised after having sold one of his inventions to the British for "thirty thousand" to find the amount paid to him in pounds instead of dollars. Afflicted with deafness for practically all his life, he attributed some of his most important inventions to this defect. He had to improve the phonograph and the telephone transmitter, he explained, so that he could hear them. The father of six children himself, his interest in young people manifested itself in tests which he devised to choose from America's youth the boys most deserving of scholarship.

Edison was the recipient of many honors, among others a congressional medal in 1928 "for development and application of the inventions that have revolutionized civilization in the last century." It is gratifying that an historical record of his achievements is to be preserved for future generations in the museum built in recent years by Mr. Ford at Dearborn, Mich. In an era of invention unmatched in the history of the world, Edison's name stands forth pre-eminently as one of the greatest contributors to the welfare of mankind.

Utility-Dealer Electric Show Staged at Vallejo

THAT an electrical show is an excellent means both of arousing the enthusiasm and interest of the electrical industry and exciting the curiosity and buying desires of the public was given excellent demonstration at Vallejo, Calif., Oct. 7-9, when six dealers in electrical appliances and the Vallejo Electric Light & Power Co. combined efforts to stage one of the greatest affairs of its kind ever held in northern California.

Cooperation of three Vallejo newspapers, the *Chronicle*, *Times-Herald* and *Evening News*, was manifest in special editions of the papers announcing the school and carrying large advertisements of all of the dealers. Participating with the power company in the affair were the Federal Electric Co.; the Vallejo Radio Electric Shop (W. Price, proprietor); Don's Radio Den; the Genereux Radio Co.; and Rhodes Electric Co. Manufacturers' representatives and wholesalers also assisted with the plans. The demonstrators were Mrs. Margaret Menke, representing the Vallejo Electric Light & Power Co., who demonstrated cooking and baking; Miss Bishop, representing Waters-Genter Co. (Toastmaster and Wafflemaster); Mrs. Ritter, Edison General Electric Appliance Co. (Hotpoint appliances); and Miss Lauretta La Mar, of the L. H. Bennett Co., who demonstrated all makes of refrigerators and sold the refrigeration idea generally. Domestic science classes from the grammar and high schools were brought in groups to the show.



Several appliance manufacturers sent their demonstrators to the show

The affair was held in the Sportsman's Pavilion at Sonoma and York Sts., formerly a large boxing arena, later an indoor golf course. While its high spot was the electric show, bakers, meat markets and several grocery and food supply merchants also contributed and gave demonstrations of their products. A particular feature was a meat cutting exhibition.

A grand prize of an Easy ironer was given on the last day of the show. Dealers drew lots first for the appliance to be given. Then lots were drawn to see which dealer would supply the appliance thus selected, all of the other dealers participating in paying the cost of the grand prize. There were also numerous other daily prizes given at each of the afternoon and evening sessions.

A stage had been set up at the end of the hall from which the demontrations were given, loudspeaker equipment being provided; dealers had booths displaying their particular appliances around the sides of the hall. The Vallejo Electric Light & Power Co. had two exhibits, one an appliance display and another an educational display of metering and testing equipment. The first Pacific Coast demonstration of the new General Electric "Flatplate" ironer was given at this show.

Al Caspar, president and general manager of the Vallejo Electric Light & Power Co., was highly pleased with the entire show and particularly with the manner in which the dealers cooperated to make it a success. Dealers also expressed themselves as highly satisfied with the effort and some were anxious to continue it another day. A total of 3,696 tickets were given out for the grand prize during the three afternoons and evenings, making an average attendance of over 600 at each meeting. The last meeting was jammed to the roof and people had to be turned away. Both dealers and the power company hope to make the show an annual affair.

Crowds literally reached to the ceiling, and many were turned away at the electric show put on jointly by Vallejo dealers and the Vallejo Electric Light & Power Co.

Edison Co. Refuses Tulare Purchase Offers

The Southern California Edison Company Ltd. has declined all offers of the city of Tulare, Calif., to purchase the company's distributing system in Tulare. The city's most recent offer, setting Oct. 15 as the latest time for acceptance, met with no response from the company, as company officials previously had announced that the Tulare system was not for sale. It is said that Tulare proposes to ask the state railroad commission to set a valuation on the system so that condemnation proceedings may be instituted.

The Tulare proposal setting an acceptance deadline offered $120,000 for the system, based on the city's appraisal of $112,000 and the offer of a bonus of $8,000. In the event of acquisition of the system, it has been announced, Tulare would purchase electric energy from the Edison company for local distribution.

"Sunrise" Is Theme of Edison Company's Range Show

BEGUN with a color lighting effect depicting a sunrise, and carrying this thought throughout the morning and afternoon session, the Southern California Edison Company Ltd. launched its annual fall range campaign with a sales show in its own auditorium in Los Angeles on Oct. 19. H. C. Rice, merchandising manager, was master of ceremonies and producer.

During the "sunrise song service," led by Myron McNeal, with which the meeting opened, the lighting effect produced on the stage revealed a dazzling display of new models of electric ranges being featured in the drive.

W. L. Frost, vice-president in charge of commercial activities, was the first speaker, presenting the "100%" cards to salesmen having previously achieved their quotas. Next came the "Hotpoint Hour," in which three Edison General Electric Appliance Co. men presented their story and the new Hostess model range. P. H. Booth urged selling the higher quality ranges both because of greater income to themselves and greater satisfaction to the consumer. C. N. Willard depicted the use of the new "visualizer" book by which each of the former objections to electric cooking are answered. J. C. Hoyt closed this period with an inspirational talk, "How Far Can You Walk Into the Woods?", ending by making the point that it was better to start with the highest and work down, just as it was easier to walk down a hill than up.

R. H. Ballard, vice-president and general manager, in a talk entitled, "When the Sun Comes Over the Mountain," first paid tribute to Thomas Alva Edison whose good works, he said, would live forever. He gave his views as to domestic and foreign economic conditions, detected signs of improvement, cited authorized local projects which will result in circulation of large sums. Emphatically he denied that the company had any intentions of going out of merchandising.

Construction work, he pointed out, was done for several years ahead. A tremendous boom in selling is needed now, he said, to catch up to the construction boom of the past several years. No other agency, he said, could handle the selling of ranges on the scale it must be done. Ending, he showed how a return to normal consumption by the public would bring revenues back to a point at which more rate reductions might be expected.

The morning closed with an excellently presented personal improvement talk by Elliott C. Hensel, advertising director, *Los Angeles Daily News*, entitled "A Depression-proof Sales Personality." "The weaker the salesman, the more he wants to give away," was one of his epigrams. He defined personality as character expressed, and proceeded to describe the requisites for a developed personality.

After a luncheon at the Masonic Club as guests of the Hotpoint and Westinghouse organizations, the "Westinghouse "Salute" was given by John A. Clark, Pacific Coast sales promotion manager, and C. A. Meier, Pacific Coast regional sales manager. Mr. Clark gave a rousing talk on the combining of product, name and reputation, and active selling effort for a successful range campaign. Mr. Meier, making his first Western public appearance, proved a spirited and analytical speaker. He stripped selling of all bunk and chaff to present three principles of success, preparation, presentation, and perspiration. The real competition of today, he held, was man to man, more than company to company or industry to industry.

"Sales Make Work" was the topic of F. G. Hamilton, superintendent of operations. He told of a study made which revealed that for every range sold, 35 employees in 30 different classifications are called upon to contribute to the final satisfaction of the customer. He expressed disappointment that the quota of 360 ranges among the 48 salesmen, H. C. Rice's "a range per week per salesman," was so small, saying his crews could connect and serve over 50 per day. Each range represents $127 in labor, and a total cost of $400 to serve, all factors included. He ended by depicting the market as the 75,000 residence meters not yet carrying a range.

R. G. Kenyon, special agent of the company, likewise gave an inspirational talk, making of a salesmen's work, courage, confidence, knowledge and personality a ladder over sales resistance to a completed sale. Cooperation, he warned, was a good idea if it was not used as something to lean on. In ending, he likened the times to the shaking of a basket of walnuts. When the process was finished, the really big walnuts, or men, would be found on top.

Fred B. Lewis, assistant general manager, with the aid of charts, depicting the decline in revenues caused by water shortage and the increased fuel cost for steam of $1,323,000, characterized salesmen as the company's white hopes. On them he placed the responsibility to bring salaries and working days back to normal.

It was easy to see why tourists, the state's third largest source of new income, flock to southern California, when Charles A. Horworth, field secretary of the All-Year Club, told what tourists mean as a profitable industry. His own charm and persuasiveness were an ideal of attainment to any salesman, and his final word applicable to all sales programs. In this he showed humorously how unbecoming gloom was to a land selling sunshine in large doses against the organized competition of 300 other communities and all foreign countries.

After pinning a 25-year badge upon Stanley Loth, veteran salesman, W. L. Frost closed the one-day sales convention with a word about the obligation of employees to the success of the company.

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Suit Would Stop Purchase Of Seattle Light Bldg.

A plan of the Seattle city council to take over the abandoned City Light Bldg. on Third Ave. and Madison St., and to buy in the stock now held by individuals in the City Light Building Co. (see ELECTRICAL WEST, Oct. 1, 1931, p. 196), faced legal obstacles with the filing of a suit in the superior court last month by Norman D. Abrams, Seattle property holder, to enjoin the city from carrying out its plan of action.

Abrams challenges the city's legal right to reimburse the architect and contractor of the structure, and his complaint recites that the city was under no legal compulsion to reimburse anyone and might under the terms of its lease with the building company, seize the building as "liquidated damages" for breach of contract. The suit further sets out that stock in the building company which the city proposes to buy is "wholly and totally worthless."

A superior court judge is asked to enjoin permanently City Treasurer H. L. Collier and City Treasurer Harry W. Carroll from paying out city funds, and to declare void the ordinance of Sept. 24 which authorized such payment. The ordinance appropriated $84,000 for Earl W. Morrison, architect, and the Sound Construction Co., and $105,000 for the purchase of the stock.

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WOMEN PUT ON PLAY FOR COAST COUNTIES EMPLOYEES—Under the direction of Pierre Vinet, new business manager of the Coast Counties Gas & Electric Co., the one-act play, "Are We in It?" by Marge Edwards of the San Diego Consolidated Gas & Electric Co., was recently presented at Santa Cruz, Calif., by the women's committee of the Coast Counties Gas & Electric Co. for employees of the utility. The play was first presented at the P.C.E.A. convention at Del Monte last June. The Santa Cruz performance was received with so much enthusiasm that it has been decided to present the play to employees in other districts served by the Coast Counties company. The play is an entertaining plea for the better education of power company employees in public relations deportment.

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CUMBERLAND, B. C., has taken over the Cumberland Electric Light & Power Co., Ltd., and proposes an immediate cut in lighting rates.

Los Angeles Seeks to Acquire Mono Lake Waters

Condemnation proceedings entailing the expenditure of approximately $7,000,000 for the acquisition of land and water rights in the Mono Basin of California, as an addition to the Sierra Nevada mountain water supply of the city of Los Angeles, were authorized by the Los Angeles city council in an ordinance adopted Oct. 6. Funds for the purchases will come from a $38,000,000 water bond issue voted in 1930.

Suits against 167 defendants, including the Southern Sierras Power Co., will be started immediately. Action against the Southern Sierras company will be filed in the federal court and the others in the superior court. The proceedings involve about 150,000 acres of land around Mono Lake, in Mono County, and several creeks which flow into the lake.

The water eventually will be diverted from the Mono watershed to the Owens River Valley watershed where it will be run into the Los Angeles aqueduct system. Construction of a 12-mi. tunnel through Dead Man's divide, a gigantic lava flow, will be a major part of the project.

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G. E. Employees Offered Work Insurance Plan

The General Electric Co., through President Gerard Swope, has offered its shop employees a plan which would virtually guarantee them six months' employment beginning Nov. 1. The new proposal will be voted on by employees of the company who are members of the General Electric unemployment pension plan.

The plan provides that all those on the payroll Nov. 1, 1931, will receive from that time until April 30, 1932, not less than the equivalent of one-half of their average weekly earnings for full time, but in no case more than an average of $15 a week unearned. If actual earnings are above that average, however, the employee is to receive his actual earnings.

Employees are to be assigned work outside their regular work, if necessary, at the prevailing rates of pay for such work. The unemployment emergency fund, started Dec. 1, 1930, from which $1,000,000 has been distributed to employees, is to be augmented by increasing the contributions of 1 per cent of earnings now being made by all employees who are working more than half time to 2 per cent, the company increasing its own contribution to match these of the men. Finally, if these two methods are inadequate, the board of directors of the company will be asked to authorize additional payments by the company to the unemployment emergency fund without increasing the employees' contributions.

THE CALIFORNIA PUBLIC SERVICE CO. has applied to the California Railroad Commission for authority to put the same rates in effect in Cedarville and adjacent territory, Modoc County, that are now effective in Alturas, excepting, however, the provision in the Alturas rate schedules for a 5 per cent cash discount on the bills of consumers. The application states that the bills of Cedarville consumers under the proposed schedules will be substantially the same as under the schedules now in effect. The proposed schedules, the application further recites, conform to the principles of rate-making established by the Railroad Commission. The desirability of having the rates at Alturas and adjacent territory and Cedarville and adjacent territory standardized and uniform is also urged.

THE COLUMBIA BASIN PROJECT in Washington was the subject of a conference of government engineers held at Spokane Oct. 15. Representatives of the U. S. Bureau of Reclamation in attendance at the conference were L. N. McClellan, of Denver, chief electrical engineer of the Bureau; Homer J. Gault, who is now directing the construction of the Cat Creek dam in Nevada for the Navy; E. B. Debler, hydrographic engineer from Denver; H. W. Bashore, who has been in Spokane for several months studying the Columbia Basin project; and R. B. Williams, of Washington, D. C. Major C. L. Sturdivant, of Seattle, was one of two army engineers assigned to the conference.

San Joaquin Ready to Build Herndon Steam Plant

Final approval of the plans and specifications for the 50,000-kw. steam plant to be built by the San Joaquin Light & Power Corp. at Herndon, Calif., about 11 mi. north of Fresno, has been given and construction will be started in the next two or three months. The project comprises a power plant, a substation, and a pipe line for the transmission of natural gas from Kettleman Hills at a total cost of $6,210,000. The substation has been in operation since July of this year. Harold K. Fox, chief construction engineer for the San Joaquin Light & Power Corp., will supervise the erection of the steam plant, which is expected to be ready for operation by the summer of 1933. Its cost is estimated at $4,610,000, that of the pipe line at $1,000,000, and the substation, adjacent to the power plant, was built at a cost of $600,000, making the total of $6,210,000.

Announcement of the plans for the construction of this steam plant was first made in November, 1930, but actual construction was postponed because the demands for power were lower than had been anticipated.

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ASHCROFT (B. C.) Water, Electric and Improvement Co. is preparing plans and making application for a new 400-hp. hydro plant on the Bonaparte River, to supplement present 250-hp. plant on the Thompson River.

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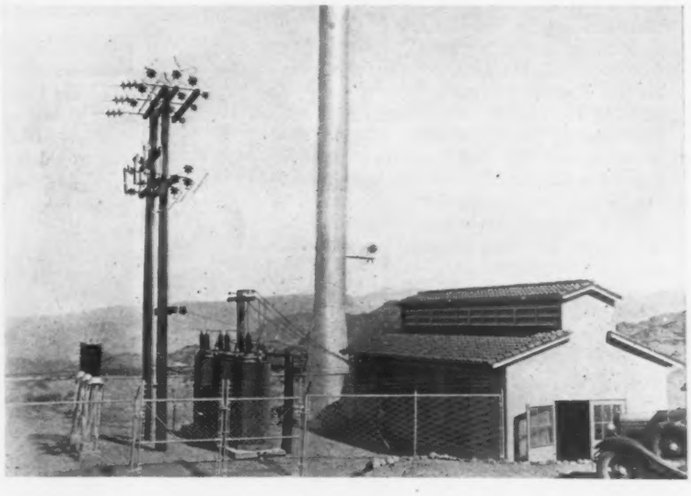
Bringing Water to Hoover Dam Workers



One of two electric pumping stations recently put into service to pump water from the Colorado River to provide a water supply for Boulder City, busy Hoover Dam community. Water is lifted a total of 2,000 ft. by the two pumping stations. The equipment at each of the stations is identical and consists of three pumps of 650-g.p.m. capacity each. Each pump is operated by a 200-hp. motor. Water is carried for a distance of 8 mi. through a 12-in. pipe line. Power is supplied from a government line, using energy purchased from the Southern Sierras Power Co.

Utility District Formed In Northern California

At an election held on Oct. 3 in Lassen County, on the northeastern border of California, the voters approved by a five-to-one vote the organization of the Lassen Municipal Utility District to include Susanville, Halltown and Milwood.

The movement for the formation of the district was sponsored by a citizens' committee and had its inception in a campaign for lower electrical rates. At the election five directors of the new district were elected, all sponsored by the citizens' committee, and three candidates, rumored to have been sponsored by friends of the Lassen Electric Co., which serves the Susanville district, were defeated.

In discussing the situation, Robert M. Cook, of Susanville, chairman of the citizens' committee, stated: "This controversy was started to force the Lassen Electric Co. to give rates here comparable with those in effect in other California cities. The principal object of the controversy, and the only one that has been considered from the beginning, is to assemble the necessary machinery which will enable the district to take any steps that circumstances may require."

Commenting on the election, Mr. Cook said: "The vote on Saturday is an indication that the stranglehold of public utilities companies is being broken."

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Preliminary Work Starts On Colorado Aqueduct

Road construction and other work preliminary to proposed construction of the Colorado River aqueduct by the Metropolitan Water District of Southern California was started Sept. 30 following the passage Sept. 29 of a $220,000,000 bond issue for the project. The issue carried by a vote of 224,379 to 46,384. Thirteen cities are included in the district. It was announced at district headquarters in Los Angeles that a small surplus of tax money raised this year for administrative and investigation purposes would be used at once to defray the cost of the preliminary work.

The cities of Glendale, Pasadena and Burbank, in addition to giving large majorities for the Metropolitan Water District bond issue, each voted to enter into 50-year contracts with the federal government for electric energy to be generated at Hoover Dam and with the Los Angeles Department of Water and Power for transmission of the energy to the respective cities. Glendale voted to contract for 80,000,000 kw.-hr. per year; Pasadena 68,617,080 kw.-hr. per year; and Burbank 25,000,000 kw.-hr. per year. The contracts call for a top rate of 4.59 mills at the start and an average rate of 3.77 mills throughout the period of the contracts.

The bond issue will finance initial construction cost of the diversion dam in Upper Parker Canyon, 155 mi. below the Hoover Dam site; the main aqueduct, to deliver 1,500 sec.-ft. or approximately 930,000 acre-ft. per year; terminal storage reservoirs and some delivery lines to member cities. Cost of these items is estimated at $218,844,000. Deferred construction would increase the cost of the project to $283,536,000, the difference to be financed by another bond issue or from revenue, as determined later.

A labor policy limiting employment of aqueduct workmen to established residents of the water district has been adopted by the district's board of directors. Thousands of applications for jobs already have been made. A small group of workers has been engaged to do what little preliminary field work can be done with the limited funds available until the bonds can be validated by court action and sold. It is expected that it will be six months before any general hiring of workmen can be done. Assistance in preventing an influx of laborers to southern California through the lure of the aqueduct project has been asked of the United States Department of Labor by the water district directors.

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THE CITY OF EUGENE (ORE.) has awarded to the State of Oregon the bid on light and water bonds totaling $200,000. The bid offered by the state treasurer was 4½ per cent interest and a premium of 61 c. on every $100. The municipality issued these securities to take the place of a similar issue bearing a higher rate of interest.

P. G. and E. to Withdraw From Irrigation District

Under the terms of a contract entered into between the Pacific Gas and Electric Co. and the directors of the Turlock Irrigation District, the power company will withdraw as a distributor of electricity in the Turlock territory in Stanislaus and Merced Counties, Calif. The directors of the irrigation district have agreed to purchase for $170,000 the electrical properties of the Sierra and San Francisco Power Co., in the Turlock area, now leased by the Pacific Gas and Electric Co. The District will pay for this through the delivery to the power company of surplus electrical energy generated at periods of the year when not required for distribution. The Turlock Irrigation District owns the 4,000-kw. La Grange power plant and also is entitled to 68.46 per cent of the power generated by the Don Pedro plant, which is owned jointly with the Modesto Irrigation District. The delivery of the power will be made over a period of eight years.

The property to be transferred consists of about 46 mi. of distribution lines and about 45 mi. of transmission lines. Approximately 28 mi. of the distribution lines now serve territory not reached by the Turlock Irrigation District's present lines. Income from the property to be acquired amounted to $18,500 for the year 1930, customers served numbering about 300. Actual date of the transfer has not been announced.

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Lends a Hand in Farming Operation

So interested is O. B. Coldwell, vice-president, Portland General Electric Co. (the broad-backed gentleman in shirt sleeves) in his company's application of a 5-hp. single-phase motor to ensilage cutting and silo filling, that in this instance he fed the ensilage cutter himself. The farm is that of S. B. Hall near Sherwood, Ore. Six tons an hour is the average for this 13-in. motor-driven cutter, at a cost of less than 2c. per ton

Appliances Displayed at Canadian Exhibition

Display of electric appliances put on by the B. C. Electric Railway Co., Ltd., at the recent annual Canada Pacific Exhibition in Vancouver. Much interest was shown in the display of electric clocks and a number of sales were traced directly to the exhibit. The spectacle of a Royal cleaner with its noxzle fitted into a glass cylinder sucking up a 14-lb. weight with ease, proved a great attraction to the crowds

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CONSUMERS COMPLAIN OF VALLEJO (CALIF.) RATES—A complaint filed by 25 consumers asks the California Railroad Commission to investigate the electric rates charged by the Vallejo (Calif.) Electric Light & Power Co. The complaint states the rates now charged are unjust, unreasonable and discriminatory.

EDISON CO. ON FIVE-DAY WEEK—All departments of the Southern California Edison Co. Ltd. are now on a five-day week schedule with corresponding pay adjustments, according to a statement made by John B. Miller, chairman of the board, in a letter sent out last month to holders of the preferred stock of the company. The completion of several of the larger construction projects of the company and the general slowing down of business were given by Mr. Miller as reasons for adoption of the new schedule.

HAT CREEK FARMER GRANTED PERMANENT INJUNCTION AGAINST P. G. and E.—On Sept. 30 a decision was handed down by the California Supreme Court in favor of Louis P. Joerger, a farmer with land riparian to Hat Creek, Calif., by which is made permanent a temporary injunction which the Shasta County Superior Court had granted on Feb. 6, 1931, restraining the Pacific Gas and Electric Co. from diverting water from Hat Creek. The company had been using the water in the operation of its Hat Creek power house No. 2, which has been inoperative since the granting of the temporary injunction. (See Electrical West, Dec. 1, 1930, p. 319; March 1, 1931, p. 152; April 1, 1931, p. 206.)

P. C. E. A.

Commercial Men Launch Year's Work Undaunted

"A Wise Man Looks Ahead," quoted Frank Weiss, commercial manager, Los Angeles Gas and Electric Corp., chairman of the P.C.E.A. Commercial Section, using the ancient proverb to inspire the year's achievements for the numerous committeemen of the Section, at its first conclave, Los Angeles, Oct. 15-16, 1931. That thought predominated the entire proceedings of the two-day session. There was a representative attendance from all parts of California, bringing together all branches of the industry,—contractor, wholesaler, manufacturer and central station commercial men.

A number of decided declarations of policy and of program made the conclave one of unusual importance to the industry. Particularly plain-spoken and definite was R. E. Fisher, vice-president of the association, and vice-president in charge of public relations and sales, Pacific Gas and Electric Co. Mr. Fisher, speaking at the opening session, enunciated emphatically the principle that the light and power companies must never relinquish the right to sell and pioneer merchandise which will build load and serve the public. Among the statements he made were:

A definition of the purposes of a new business department is needed. It should be inclusive of acquiring new consumers, developing new applications of energy and building business with existing consumers. It should be set up to do load building primarily, doing merchandising only as a means to build load.

More and more contact is needed with dealers, both as a group and individually. This calls for the closest possible relations. The utility must never burn its bridges behind it by saying, "We will not merchandise." It must always pioneer. Despite the mass contact by the Pacific Coast Electrical Bureau, each utility must maintain its own contact with its own dealers.

Since no appliance has ever been accepted until utility employees use it generously themselves, controlled employee discounts are necessary to stimulate their use of the appliances. Utilities must recognize the legitimate dealer in business and govern their policies so as to provide fair list selling prices, finance charges which dealers can meet, lengths of term payment periods dealers can match, trade-in allowances only when dealers may offer the same, and elimination of premiums as out-dated selling bait.

Mr. Fisher described his company's "floorline policy," which calls for active promotion of electricity for cooking and auxiliary heating, lighting, and appliances, and gas (in the basement) for central heating and hot water heaters. He declared for more employee educational work, a means of developing a long neglected opportunity. To the men in construction and maintenance crews now on short weeks, his company, by means of a traveling troupe, will tell of the opportunities for recapturing income and indirectly developing more work for themselves by spare-time selling of lamps, and bonus tips on appliance sales.

Another strong declaration Mr. Fisher made was that constant contact with existing consumers must be maintained by all possible means. He said also that sales staffs of the future must be manned largely by sales people with a technical background. Advertising must be better coordinated to both the sales and public relations aspects of company business, he went on, ending by pronouncing a warning that any time a sales department changes to become a high-pressure sales organization it is destined to be short lived.

Addison B. Day, president of the P.C.E.A., preceded Mr. Fisher with a reminiscent talk in which he depicted both the gas and electric industries at various periods when their particular services seemed to face unsurmountable sales obstacles. Each of these had been scaled or removed. In the face of present obstacles this history should encourage even the most downcast, he maintained.

A third address at the opening session, was made by LeRoy M. Edwards, general counsel, Southern Counties Gas Co. He reviewed the case for public utility merchandising as he had prepared and presented it to a committee of the California Legislature at the time the Senate bill seeking to prohibit utility merchandising was under consideration. His contention was that a utility's right and duty to merchandise rested upon three principles:

1. It was in the interest of the public because by building load it helped to reduce rates by making more efficient use of company facilities. Dealers were set a standard of appliances and manufacturers were required to improve their products because of it.

2. Merchandising was in the dealers' interest because though making but a tenth of the sales, utilities did nine-tenths of the advertising and promotion.

3. Merchandising was vital to the business. He cited incidents of stagnant growth and poor consumption before merchandising of gas appliances in Long Beach, and greatly increased use after merchandising. No dealer can possibly have the incentive to originate the new business needed, he claimed.

On the other hand, Mr. Edwards warned, there was justice in dealer complaints regarding many present practices and policies. Closer understanding must be established between utility and dealer for harmonious relations.

At the noon luncheon the first day of the conclave, guests included A. F. Hockenbeamer, R. H. Ballard, John Coughlan, Roy Reppy, Dr. Hoxie and Miss Clarita Scott. Dr. W. B. Moriarty, professor of economics, University of Southern California, gave in "An Economist's Views of the Depression," a whimsically wise talk on factors which have caused a need for deflation of artificial values. He maintained that practically any production could be absorbed because standards of living could be raised to meet the production.

The difficulty arose, he showed, because supply, instead of filling active demand for ral products, was manipulated to create artificial demands. Money surpluses then went into speculation on these artificial demands instead of into real supply.

"If we could somehow inspire ourselves to work in our own fields, where we know something, instead of diverting ourselves by manipulating something we don't know anything about, we could come out of this depression. Our incomes must be spent on real values. As long as they are spent on things that are being produced instead of manipulated, we help maintain production. If we could only regard gambling as a private pleasure instead of as a source of income, we'd be all right," he said in the course of his remarks.

Reconvening, the conclave split up into individual committee meetings, in which each committee determined upon its objectives for the year. A resume of these objectives will be published in the Dec. 1 issue of ELECTRICAL WEST.

POWER BUREAU

P. P. Pine, Chairman

Additions to handbooks and compilation of new handbooks by *general power committee*, one on diesel and gas engines by W. R. Chawner, for the southern committee, and one on steam isolated plants, by W. Parks for the northern committee. The *oil field committee* will publish a complete handbook, as will the *air conditioning committee*. The *agricultural power committee* will add to its handbook reprints of L. S. Wing's article, "Why the Demand Charge?" a table of water cost units, safety rules for the farm, competitive power data, and a table of unit power requirements for farm equipment.

GENERAL BUREAU

Lloyd Henley, Chairman

Will seek executive committee adoption and member company use of the N.E.L.A. employee information program. Instead of an essay contest an examination contest on "Government Ownership" will be held this year.

LIGHTING BUREAU

George Rankin, Chairman

The *educational lighting committee* will sponsor a series of talks to P. G. and E. and Southern California Edison Co. employee meetings during October and November. The *home lighting committee* will prepare two chapters for the P.C.E.B. booklet, and add farm and barnyard lighting data. A questionnaire is being prepared to be given employees for data on their own home lighting. The *commercial lighting committee* will prepare a condensed lighting manual for use of contractors and estimators. The *sign and outdoor lighting committee* will seek to standardize methods, legislation and forms for making proposals for electric signs. It advocates equipping a truck to demonstrate floodlighting. A model garden lighting installation is planned for the next convention. *Industrial lighting committee* will prepare additions to the Red Seal specifications covering industrial structures. The *street and highway lighting committee* will prepare an article on highway lighting for a development magazine.

MERCHANDISING BUREAU

Pierre Vinet, Chairman

Appliance committees will seek basic causes for falling off of appliance business and suggest remedies, develop plans to increase health appliance sales, analyse the vacuum cleaner business and suggest a revival program plan to develop the ironer and washer market. Like all other committees of this bureau, these committees will prepare chapters for the Pacific Coast Electrical Bureau booklet on home electrification. *Range committee* will organize to capitalize the N.E.L.A. three-year range drive, sponsor employee range campaigns, and seek to develop a range wiring plan similar to that of The California Oregon Power Co. *Refrigeration committee* will organize the industry for the second year of the three-year program, set quotas for north and south, and organize committees to accomplish the results desired. *Water heating committee* will study the matter of basing salesman's compensation on the load value of the appliance to the central station, study rate structures which will promote water heating, seek to revise Red Seal specifications to include requirements for proper plumbing and show water heaters in the plan, and endeavor to stop malicious advertising of dangerous devices offered the public. *Commercial cooking committee* will endeavor to have the field of present consumers combed for added load and advocate specialized men to handle heavy-duty appliance selling. *Air heating committee* will outline a sales policy, enlist jobber and contractor support, cooperate with the air conditioning committee, study types of insulating materials and analyze costs of operation of various types of installation in varying sizes of homes. *Wiring and Red Seal committees* will study wiring needs of appliance committees, wiring methods, assist in promoting wiring sales plans such as Red Seal, work out a wiring program for old homes, study wiring on consumers' premises, contact other branches of the industry with respect to wiring, seek to sell the adequacy idea against the cheapness idea to commercial men, prepare popular talks and sales stunts for public meetings, work for standardization and simplification of wiring materials and promote stabilization of wiring economics.

A distinct innovation in conclave programs was made on Friday morning in a round table discussion forum under the general heading of "Today's Opportunity." This was presided over by Harry Carroll, electric sales manager, P. G. and E. Co., vice-chairman of the section. Leo Gianini, Edison Lamp Works, San Francisco, made a provocative address on lighting opportunities which started general discussion. His talk will be published in ELECTRICAL WEST in full in a subsequent issue.

R. C. McFadden, Southern California Edison Co. Ltd., started discussion of power development opportunities in a similar fashion. The session ended with a discussion of merchandising opportunities, provoked by a talk by H. H. Courtright, Valley Electrical Supply Co., Fresno. This round-table session proved to be one of the most valuable features of the conclave, bringing to light many ideas and stimulating thought and action.

Officers and Committee Personnel, 1931-32

GENERAL OFFICERS

A. B. Day, L. A. G. and E. Corp., president.
R. E. Fisher, P. G. and E. Co., first vice-president.
W. C. Mullendore, So. Cal. Ed. Co. Ltd., second vice-president.
N. R. Sutherland, P. G. and E. Co., treasurer.
K. I. Dazey, P.C.E.A., managing director.
V. W. Hartley, P.C.E.A., assistant managing director.

EXECUTIVE COMMITTEE

G. E. Arbogast, California Electragists.
E. B. Criddle, So. Sierras Pwr. Co.
A. M. Frost, P. G. and E. Co.
W. L. Frost, So. Cal. Ed. Co. Ltd.
S. E. Gates, G. E. Co.
D. E. Harris, G. E. Supply Corp.
A. E. Hitchner, Westinghouse E. & M. Co.
A. E. Holloway, S. D. Cons. G. & E. Co.
W. R. Marshall, Westinghouse E. & M. Co.
H. L. Masser, L. A. G. and E. Corp.
A. F. Morairty, Central Ariz. L. & P. Corp.
G. C. Tenney, McGraw-Hill Co. of Calif.

ACCOUNTING SECTION

EXECUTIVE COMMITTEE

A. B. Carpenter, S. J. L. & P. Corp, chairman.
J. A. Cannon, S. D. Cons. G. & E. Co., vice-chairman.
Bordwell, J. S., So. Sierras Pwr. Co.
Dayton, H. P. Sierra Pacific Pwr. Co.
Hodges, E. W., P. G. and E. Co.
McCullough, D. A., Standard Management & Operating Co.
Painter, H., Tucson G., E. L. & P. Co.
Reynolds, L. A., P. G. and E. Co.
Simmons, E. N., L. A. G. and E. Corp.
Staal, C. P., So. Cal. Ed. Co. Ltd.
Terry, H. T., P. G. and E. Co.

CLASSIFICATION OF ACCOUNTS COMMITTEE

E. N. Simmons, L. A. G. and E. Corp., chairman.
Bordwell, J. S., So. Sierras Pwr. Co.
Hodges, E. W., P. G. and E. Co.
Reynolds, L. A., P. G. and E. Co.
Staal, C. P., So. Cal. Ed. Co. Ltd.

CUSTOMER BILLING AND RECORDS COMMITTEE

S. A. Northington, So. Cal. Ed. Co. Ltd., chairman.
Auld, Loris, S. J. L. & P. Corp.
Krymer, C. C., S. D. Cons. G. & E. Co.
Lovejoy, Fred, Coast Counties G. & E. Co.
Moore, O. L., L. A. G. and E. Corp.
Oldis, F. E., P. G. and E. Co.

FIXED CAPITAL COMMITTEE

Vallery White, So. Cal. Ed. Co. Ltd., chairman.
DeVoe, C. W., S. D. Cons. G. & E. Co.
Dodge, E. E., P. G. and E. Co.
Kirksey, C. L., Coast Counties G. & E. Co.
May, C. C., S. D. Cons. G. & E. Co.
Miller, P. C., P. G. and E. Co.
Reed, L. B., So. Sierras Pwr. Co.
Rudkin, C. N., So. Cal. Ed. Co. Ltd.
Sandusky, Manuel, L. A. G. and E. Corp.
Sims, E. R., So. Sierras Pwr. Co.
Torvison, Ray, Sierra Pacific Pwr. Co.
Walthall, A. S., S. J. L. & P. Corp.

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McCollough, W. J., So. Cal. Ed. Co. Ltd.
McKee, H. O., So. Cal. Ed. Co. Ltd.
Watkins, E. F., So. Cal. Ed. Co. Ltd.
Weiss, C. D., S. D. Cons. G. & E. Co.

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G. M. Richardson, So. Cal. Ed. Co. Ltd., vice-chairman.
Wm. de Ward, S. D. Cons. G. & E. Co., secretary.
Braun, C. E., Coast Counties G. & E. Co.
Condon, E. S., Maydwell & Hartzell, Inc.
Glosser, W. W., Hubbard & Co.
Hanson, F. P., P. G. and E. Co.
Kelley, C. A., So. Sierras Pwr. Co.
Kortick, J. C., Kortick Mfg. Co.
Mason, D. P., S. J. L. & P. Corp.
Scoville, H. H., P. G. and E. Co.
Watkins, E. F., So. Cal. Ed. Co. Ltd.

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L. A. Reed, L. A. G. and E. Corp., chairman.

Personnel Subcommittee

L. A. Reed, L. A. G. and E. Corp., chairman.

Legal Responsibilities Subcommittee

T. B. Parks, L. A. G. and E. Corp., chairman.

Traffic Subcommittee

E. O. Mahoney, P. G. and E. Co., chairman.

STORES COMMITTEE

W. J. McCullough, So. Cal. Ed. Co. Ltd., chairman.

Rules Subcommittee

W. J. McCullough, So. Cal. Ed. Co. Ltd., chairman.

Tools and Toolrooms Subcommittee

Wm. Maddock, L. A. G. and E. Corp., chairman.

Operating Costs Subcommittee

E. A. Bullard, L. A. G. and E. Corp., chairman.

Insulating Oils Subcommittee

Wm. de Waard, S. D. Cons. G. & E. Co., chairman.

Material Testing Subcommittee

A. D. MacIntyre, P. G. and E. Co., chairman.

STORES ACCOUNTING COMMITTEE

A. W. Winkleman, P. G. and E. Co., chairman.

Organization Subcommittee

E. A. Bullard, L. A. G. and E. Corp., chairman.

Invoices Subcommittee

A. W. Winkleman, P. G. and E. Co., chairman.

Manufacturing and Reclamation Accounting Subcommittee

F. Kraut, P. G. and E. Co., chairman.

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W. J. Schaeffer, L. A. G. and E. Corp., vice-chairman.
A. J. Aschoff, P. G. and E. Co., secretary.
Dennis, V. W., The Pacific Tel. & Tel. Co.
Ducker, P. H., So. Cal. Ed. Co. Ltd.
Fairbanks, W. H., Southwest. Tel. & Tel. Co.
Shaw, S. B., P. G. and E. Co.
Stanley, C. R., P. G. and E. Co.
Wainscoat, J. M., S. J. L. & P. Corp.
Weiss, C. D., S. D. Cons. G. & E. Co.

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V. W. Dennis, The Pacific Tel. & Tel. Co., chairman.
Bauer, W. H., So. Cal. Ed. Co. Ltd.
Drake, H. W., Portland Gas & Coke Co.
Fairbanks, W. H., Southwest. Tel. & Tel. Co.
Prewett, J. B., L. A. G. & E. Corp.

EDUCATIONAL COMMITTEE

H. W. Drake, Portland Gas & Coke Co., chairman.

LEGISLATIVE COMMITTEE

P. H. Ducker, So. Cal. Ed. Co. Ltd., chairman.

1932 SAFETY MOVIE COMMITTEE

J. M. Wainscoat, S. J. L. & P. Corp., chairman.

VEHICLES DIVISION

W. H. Fairbanks, Southwest. Tel. & Tel. Co., chairman.
Rondot, E. M., So. Cal. Ed. Co. Ltd.

TECHNICAL DIVISION

S. B. Shaw, P. G. & E. Co., chairman.
Hutchings, C. O., So. Cal. Ed. Co. Ltd.
McGuire, F. W., P. G. and E. Co.
Moulton, J. S., P. G. and E. Co.
Stanley, C. R., P. G. and E. Co.

UTILIZATION DIVISION

W. J. Schaeffer, L. A. G. & E. Corp., chairman.

TIRES DIVISION

C. O. Hutchings, So. Cal. Ed. Co. Ltd., chairman.

MAINTENANCE DIVISION

C. R. Stanley, P. G. and E. Co., chairman.
Bauer, W. H., So. Cal. Ed. Co. Ltd.
Dodge, R. V., S. D. Cons. G. & E. Co.
Ducker, P. H., So. Cal. Ed. Co. Ltd.
Fairbanks, W. H., Southwest. Tel. & Tel. Co.
Rondot, E. M., So. Cal. Ed. Co. Ltd.
Schaeffer, W. J., L. A. G. and E. Corp.
Weiss, C. D., S. D. Cons. G. & E. Co.

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Weiss, C. D., S. D. Cons. G. & E. Co.

HANDBOOK COMMITTEE

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Mason, D. P., S. J. L. & P. Corp.
Wainscoat, J. M., S. J. L. & P. Corp.

INSURANCE COMMITTEE

L. A. Reynolds, P. G. and E. Co., chairman.
W. E. Durfey, S. J. L. & P. Corp., vice-chairman.
Armstrong, V. D., Sierra Pacific Pwr. Co.
Cantrell, R. J., P. G. and E. Co.
Dewes, Herbert, So. Sierras Pwr. Co.
Johnson, A. C., Arizona Pwr. Co.
Peckham, H. R., S. D. Cons. G. & E. Co.
Peters, Clifton, So. Cal. Ed. Co. Ltd.
Seaver, F. E., L. A. G. and E. Corp.

PUBLIC POLICY COMMITTEE

W. C. Mullendore, So. Cal. Ed. Co. Ltd., chairman.
A. F. Hockenbeamer, P. G. and E. Co., vice-chairman.
Campbell, G. A., Sierra Pacific Pwr. Co.
Coe, E. H. Central Ariz. Lt. & Pwr. Co.
Day, A. B., L. A. G. and E. Corp.
Fischer, W. H., So. Cal. Ed. Co. Ltd.
Raber, W. F., S. D. Cons. G. & E. Co.
West, A. B., So. Sierras Pwr. Co.
Wishon, A. E., P. G. and E. Co.

Meetings

Coming Events

International Association of Electrical Inspectors, Northwest Section—Seventh annual convention at Wenatchee, Wash., Sept. 6-8, 1932 (tentative).

National Electric Light Association—Annual convention and exhibit, Atlantic City, N. J., June 6-10, 1932.

National Electrical Wholesalers Association, Pacific Division—Thrice yearly meeting, Hotel Del Monte, Del Monte, Calif., Feb. 4-6, 1932.

Pacific Coast Electrical Assn.—Commercial Section meeting, San Francisco, Dec. 10-11, 1931.
Engineering Section meeting, Los Angeles, Dec. 9-11, 1931.

"Power Trust" Rapped at Los Angeles Convention

Government construction of a few great power plants "to provide the effective competition necessary to regulate the cost of electricity sold by the 'power trust'" was advocated by Senator Clarence C. Dill of Washington at the closing session of the national convention of the Public Ownership League of America held Sept. 28-30 in Los Angeles, Calif. Nearly 500 persons registered for the convention.

Only the federal government can control the power companies, Senator Dill said, and the public welfare demands that Congress protect the American people against excessive rates. City governments and state commissions are unable to do so, he said. The senator likewise declared that great mergers control the production and sale of 90 per cent of the power used in the United States.

Resistance of public ownership minded persons against private ownership of utilities was the keynote of the series of convention meetings, with speakers stressing the accomplishments of public ownership ventures in various sections of the country. Dr. Carl D. Thompson of Chicago, secretary of the league, in opening the convention spoke on "The Present Crisis and the Part Public Ownership May Play in Meeting It." Frank P. Taggart, president of the league and mayor of Glendale, Calif., and John C. Porter, mayor of Los Angeles, also were speakers at the opening meeting.

Dr. John Bauer of New York City, attending the convention as the personal representative of Governor Franklin D. Roosevelt, declared that "chewing gum flexibility" is what is wrong with the regulation of public utility corporation rates under the reproduction cost theory.

"That theory works all right when costs are rising," Dr. Bauer said. "It stretches indefinitely to provide higher rates as costs rise, but when costs fall it is difficult to get the rates flexed back again."

Public ownership affairs in Oregon and Washington were described by Ralph Clyde, commissioner of public utilities at Portland, Ore., and F. F. Fitts and W. W. Zionbeck, municipal ownership leaders of Seattle. J. D. Ross, who was ousted as superintendent of the Seattle City Light Department and later reinstated upon recall of the mayor, spoke on "The Public Projects of the City of Seattle."

H. A. Van Norman, general manager and chief engineer of the Los Angeles department of water and power, and E. F. Scattergood, chief electrical engineer of the department, described the Los Angeles water and power projects, which later were visited by some of the delegates. A number of those attending the convention also visited the Hoover Dam site on the Colorado River.

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Montana Power Co. Holds Quarterly Conference

The regular quarterly conference of division, city and office managers of the Montana Power Co. was held on Oct. 17-18 at the company offices in Butte. John C. Ryan, vice-president and assistant general manager, was chairman of the sessions.

The first day's discussion centered on electric light and power; questions concerning natural gas, which has just been added to the utility's distribution system, were taken up on the second day.

Attendance at the conference included: Bozeman—W. H. Reif, division manager; Wiley Davis. Livingston—J. R. Kaiserman, division manager. Lewiston—H. William Schmidlapp, division manager. Roundup—C. L. Belden, division manager. Great Falls—Frank Scotten, division manager; C. T. Booker, A. C. LeFebvre, E. A. Hayes. Helena—Robert O. Kerr, division manager; James Byrne. Billings—F. D. Coleman division manager; E. C. Gates. Missoula—C. H. Christensen, division manager; H. S. Thane, R. M. Veiths. Butte Division—J. Ryan Gaul, division manager; D. J. McGonigle, J. J. Thometz. Butte General Office—F. M. Kerr, general manager; W. T. Jackson, S. P. Hogan, J. R. Tomas, W. Stussy, C. W. Towne.

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TRADE PRACTICE CONFERENCE FOR ELECTRICAL WHOLESALERS—The Federal Trade Commission will hold a conference with representatives of the National Electrical Wholesalers Assn. in Cincinnati, Ohio, Nov. 11. The purpose of the conference is to have the industry consider and submit to the commission for action under its established rules and procedure suggested resolutions having to do with important trade problems and designed to promote fair practice. At least 27 resolutions will be submitted, and among the practices proposed for discussion will be (1) interference with a competitor's business, (2) selling goods below cost, (3) price discrimination, (4) commercial bribery, and (5) secret rebates.

Officers Elected by I.E.S. San Francisco Chapter

Leonard Hobbs, of The Edwin F. Guth Co., San Francisco, was elected chairman of the San Francisco Bay Cities Chapter of the Illuminating Engineering Society at a meeting of the society held Oct. 2 at the Engineers' Club of San Francisco. Robert W. Buckles, Westinghouse Lamp Co., was made vice-chairman, and Roy D. Myers, Curtis Lighting Inc., secretary-treasurer. Mr. Buckles will serve as chairman of the program committee of the society for the coming year.

The new board of managers includes W. S. Hanbridge, Pacific Gas and Electric Co.; Leo G. Gianini, Edison Lamp Works; Carl O. Martin, Benjamin Electric Mfg. Co.; James R. Cravath and G. M. Simonson, consulting engineers.

At the Oct. 2 meeting of the society Mr. Hobbs, the incoming chairman, reported on his recent visit to his company's factory at St. Louis, Mo., and to the Chicago Lighting Institute.

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Jobbers Hold Three-Day Meeting at Del Monte

Robert Sibley, executive secretary of the University of California Alumni Assn., was the speaker at the open meeting on Saturday morning, Oct. 10, the last day of the National Electrical Wholesalers Assn. convention held at Del Monte, Calif., Oct. 8-10. Mr. Sibley gave the membership a brief review of his impressions gained from a visit to Russia during the course of his European trip to attend the World Power Conference in Berlin last year.

Those who won distinction in the association's golf tournament were D. E. Harris, vice-president, Western Division, General Electric Supply Corp., San Francisco, winner of the Copper Cup; C. B. Clendenen, of the National Carbon Co., Inc., San Francisco, who received the Oakes Trophy; and N. H. Boynton, sales manager, National Lamp Works, Cleveland, winner of the Manufacturers' Cup.

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THE ENGINEERS' CLUB OF SAN FRANCISCO, at its annual election held Oct. 28, chose the following official personnel to serve during the ensuing year: president, Stanley Sharp, Standard Oil Co. of Calif.; first vice-president W. R. Birt, assistant superintendent of telegraph, Southern Pacific Co.; second vice-president, H. D. Dewell, consulting engineer; secretary, R. A. Hudson, Hunter & Hudson, consulting engineers; treasurer, A. D. Oliver, vice-president, Wells Fargo Bank. Directors for three years: E. A. Crellin, Pacific Gas and Electric Co.; Roy H. Elliott, consulting mining engineer. Short-term director: G. A. Elliott, consulting engineer.

Personals

Eastern College Claims Stanford Engineer

CHOSEN recently to head the department of electrical engineering at Worcester (Mass.) Polytechnic Institute, T. H. Morgan goes directly to his new post from Stanford University. He was born in eastern Canada and

T. H. MORGAN

received his technical training at the University of British Columbia and at Stanford University. A portion of his time was spent with the Foundation Company, and following graduation from Stanford he obtained some practical engineering experience with the Inspiration (Ariz.) Consolidated Copper Co., and with the Great Western Power Co. at San Francisco. He was called back to Stanford in 1922 as instructor in electrical engineering and in 1927 was promoted to be assistant professor.

Professor Morgan's duties at that university after 1927 included both administration and teaching. He was secretary of the electrical engineering faculty and assistant to the executive head of the department. The subjects which he taught were electrical power and machinery, illumination and electrical engineering administration.

One of Mr. Morgan's principal extra-curricular activities has been work for the American Institute of Electrical Engineers. He was counselor of the Stanford branch, chairman of the committee on prizes and awards, eighth district, in 1929; chairman of the district committee on student activities in 1929 and 1930, and a member of the Pacific Coast convention committee in 1930. He has also written professional papers on electrical engineering and Institute activities. Mr. Morgan is also a member of the Society for the Promotion of Engineering Education.

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N. LINCOLN GREEN, manager of the Tape Division of the Okonite Co., Passaic, N. J., was a California visitor in October.

FRANKLIN T. GRIFFITH, president of the Pacific Northwest Public Service Co. and its principal operating subsidiary, the Portland General Electric Co., has been elected a regional vice-president of Albert E. Peirce & Co., of Chicago. The Peirce firm, which conducts a general investment business, has charge of all customer ownership stock selling for Central Public Service Corp., which controls the Pacific Northwest Public Service Co.

JOE HELLENTHAL, distribution engineer of the Puget Sound Power & Light Co., with headquarters in the central district, Seattle, recently attended the sessions of the N. E. L. A. Engineering Section convention in Cincinnati.

CLYDE L. SEAVY of San Francisco, president of the California Railroad Commission, represented California at the annual convention of the National Association of Railroad and Utilities Commissioners held at Richmond, Va., Oct. 20-23. Mr. Seavey addressed the convention on the subject "State Commissions and Federal Courts."

DAVID S. SPECTOR, former president of The Spector Co., representing electrical manufacturers in the San Francisco Bay territory, is now president of Stanford Products, Ltd., with offices at 1663 Mission St., San Francisco. The Stanford firm is manufacturing a new line of synchronous electric clocks for national distribution.

W. C. SANFORD, manager of range and heating sales in the commercial department, Sierra Pacific Power Co., Reno, spent some time conferring with heating specialists in San Francisco and Los Angeles in October.

W. A. BECHTEL, SR., formerly vice-president of the Six Companies, Inc., which holds the contract for the construction of Hoover Dam, has been made president of that company, succeeding the late W. H. Wattis. Mr. Bechtel is president of the W. A. Bechtel Co., one of the member organizations which comprise the Six Companies, Inc.

A. F. SOUTHWICK, retired real estate and automobile dealer, has been appointed to the Los Angeles Board of Water and Power Commissioners by Mayor John C. Porter, and his appointment has been confirmed by the city council. Mr. Southwick, regarded as a vigorous exponent of municipal ownership, succeeds A. B. Prior, whose term as a commissioner has expired. The board still is without a successor to O. T. Johnson, Jr., who recently resigned.

E. B. ("DOC") COOK, illuminating engineer, formerly with the San Francisco office of the General Electric Co., has been appointed a vice-president and director of Illumination, Ltd., Oakland, Calif.

J. J. MULGREW was tendered a banquet by about 200 of his associates at Oakland, Calif., upon his retirement from service with the Pacific Gas and Electric Co. on Sept. 30, 1931, after 45 years with that company and its predecessors. He began as a lineman in the electric department in 1886, and is credited with having installed the first electric lights in the central California section. Since 1898 he has been in the gas department and was a gas salesman at the time of his retirement. Eulogistic speeches were made at the banquet by Lee H. Newbert, Eastbay manager of the power company, and Lew F. Galbraith, manager of the sales department.

WARREN H. MCBRYDE, consulting engineer of San Francisco, returned to that city last month from a trip to Europe.

R. T. PIERSON, of the Fort Wayne (Ind.) works of the General Cable Corp., spent a week in California recently.

Obituary

ANDREW J. WILEY of Biose, Idaho, consultant for the Hoover Dam project and the Colorado River aqueduct project of the Metropolitan Water District of Southern California, died suddenly Oct. 8 at Monrovia, Calif., at the age of 69 years. Mr. Wiley had been taken to Monrovia hospital Oct. 7 from the near-by San Gabriel Canyon where he had gone with a party of engineers to inspect preliminary work being done on a Los Angeles county flood control project. Formerly he had served as engineer for power projects in Idaho and Wyoming. He designed the Don Pedro Dam and irrigation system for Turlock and Modesto, Calif., and was consulting engineer for a number of other water and power projects in Central California. He was consulting engineer for the British government in India in 1927 and 1928 and was engaged as consultant for the Hoover Dam in 1929.

EDGAR R. HAWLEY, president of the Hawley-Richardson-Williams Co., electrical manufacturers' agent of Salt Lake City, Utah, died in that city Sept. 14 of acute pneumonia after an illness of about a week. Mr. Hawley was well known in the West as a heating and ventilation engineer. As a consulting engineer, he designed the heating and ventilating systems for a number of large buildings, including the state capitols of both Utah and Idaho.

GEORGE B. WILLCUTT, vice-president, secretary and a director of the Market Street Railway Co., San Francisco, and for a number of years an assistant secretary of the California Oregon Power Co., died Sept. 17 in San Francisco at the age of 72.

Contractor Dealer Inspector

Inspectors Withhold Ordinance Approval

Placed between the horns of the general run of Western ordinances, which require much more than the National Electrical Code, on the one side, and the ultra conservative national attitude induced by Eastern central station pressure, the Southwestern Section, International Association of Electrical Inspectors, did with the Pacific Coast Electrical Bureau ordinance what is usually done in a dilemma, if possible—it referred the matter back to committee. However, the P. C. E. B. ordinance, already a hard-fought compromise between all branches of the California industry, did not sink placidly into committee oblivion. It took down with it a recommendation that decision be reached and members express the much-desired approval or disapproval by letter ballot as soon as possible.

The ordinance matter injected a note of contest in what otherwise would have been an amiable and uneventful convention, Sept. 28-30, in San Francisco. So well organized was every feature of the business and entertainment program by President Ralph W. Wiley, chief of the San Francisco Department of Electricity, that the meetings sailed smoothly from one speaker to another, through discussions and explanations of the changes in the 1931 code, without event. When Arthur Veit, chairman of the ordinance committee, presented the P. C. E. B. proposed uniform ordinance without recommendation, the technical and scholastic calm of the proceedings was disturbed.

R. H. Manahan, chief of the Los Angeles Department of Electricity, and president of the I.A.E.I., defined the Southwestern Section's relation to the proposed ordinance as being without power to approve until referred to the International. The latter is committed to a policy of recommending nothing which it does not seek to make a part of the code itself. The code is the only standard it will approve.

Since the California ordinance differed from the code in some requirements, this appeared only to mean a shelving of the ordinance unless revised to conform strictly to the code. This point had already been bitterly contested in previous meetings in which inspectors as well as contractors, central stations and manufacturers' and wholesalers' representatives had taken part. As practically no California city accepts the code as sufficient unto itself at present, each supplementing it with some special and more rigid requirements, this fact had influenced the P. C. E. B. ordinance in a similar direction.

After committee reports, President Wiley, in his president's address, reviewed the history of the chapter, cited its value to the industry and pointed out its influence in eliminating petty local policies which bring complexity and confusion to the industry.

Victor H. Tousley, secretary-treasurer, I.A.E.I., also talked, telling of the growth of the national organization to its present 3,000 membership.

A noon luncheon at the San Francisco Electrical Development League, held as a joint meeting between the two organizations and the Electragists, was addressed by Arthur L. Abbott, N.E.M.A. engineer, and author of the Electragists' estimating data. He spoke on the modern trend toward adequacy, pointed out the limitless market for the industry in modernizing old residences. Of the 2,000,000 wired homes, less than 1.2 per cent are up to Red Seal standards, less than 1 per cent are adequately wired. The wiring of these to adequacy standards presents a $2 billion market, which, on a 20-yr. program, would mean $50 millions per year in wiring alone. A plan around which to build such a program is now being evolved by the Electragists. Al C. Joy, as master of ceremonies, and Clyde L. Chamblin, as chairman of the day, were also features of the program.

That afternoon R. R. Cowles. P. G. and E. Co., gave an illustrated talk on the three-phase, four-wire network distribution practice now becoming common.

Speaking on "Simplifying Inspector Problems Through Research and Standardization in Wiring Materials," A. Penn Denton, engineer director, armored conductor and metallic flexible conduit section, N. E. M. A., made some pertinent comments. The manufacturer must be responsible for the ultimate test of materials in use, he said. In the past, concerned only with whether they were selling, instead of whether meeting practical field requirements, much poorly designed material was introduced. Inspectors' experience relative to actual fitness of such materials was needed and desired. The inspectors, on the other hand, should require that Underwriters' Laboratories be upheld.

Past, present, and "practically permanent" officers of the Northwestern Section, I.A.E.I., which met in Salem, Ore. last month. Left to right: J. A. Casey, Walla Walla, Wash., electrical inspector, new president; C. E. Foster, Astoria, Ore., fire chief and electrical inspector, retiring president; and F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, Portland, re-elected to his job as "practically permanent secretary"

Tuesday morning's session was opened by Mr. Abbott's detailed description of the proposed selling standards of residential adequacy which he is working up for the Electragists for the industry wiring program.

O. B. Blackwell, transmission engineer, American Telephone & Telegraph Co., gave an interesting illustrated talk on long-distance radio telephony. After lunching at a sugar refinery, the delegates took a trip through the P. G. and E. Co's station "A," arranged by Edward Martin, San Francisco, chairman of the transportation committee.

After the inspection trip George C. Kimball, engineer, California Industrial Accident Commission, spoke on the standard form recently evolved for the reporting of accidents and fires of electrical origin. An interesting point brought out was that for work-light inside boilers, or other grounded locations, the safe limit in voltage is considered 7 volts, and that transformers and automobile headlight lamps serve this purpose most safely.

The clearing house committee (Ben Hill, Oakland, chairman) recommended no further suggested changes in code rules this year until the new 1931 rules have been given a trial. It was then that the P.C.E.B. ordinance was discussed and also referred back to committee.

Tuesday night's dinner dance was attended by a large number of people of the industry. Efforts of the entertainment committee, headed by Don C. Ray, P. G. and E. Co., San Francisco, were climaxed in this affair.

William S. Boyd, former president of the I. A. E. I. and now secretary-treasurer, Western Section, Chicago, with a talk titled "Surplus," again contributed the inspirational message of the convention. He demonstrated the necessity for a surplus of energy, of strength, of power. Likewise surpluses in adequacy must be provided for in wiring, he said.

"The most annoying manifestation of failure to provide surplus or reserve involves the lack of traffic capacity in our city streets, which lack is costing our citizens millions of dollars every year and the remedy is being slowly applied at a staggering expense, all because the builders failed to provide a surplus," he said in concluding.

Commander Thomas J. Maher, coast and geodetic survey, U. S. Department of Commerce, related the process by which range finding by electrical means is used in locating earthquake disturbances and how a microphone is used in sounding for ocean depth. The remainder of Wednesday morning's and a portion of the afternoon's session were devoted to explanations of 1931 code changes by Mr. Tousley.

In "Wiring as She Is Spoke," Wm. A. Cyr, associate editor, ELECTRICAL WEST, and chairman, wiring sales committee, P.C.E.A., repeated the address made as a report of that committee last year, and titled "This Now Wiring." (See ELECTRICAL WEST, May 15, 1931, p. 301.)

George Kimball announced the Industrial Accident Commission's intentions to revise the California Safety Orders, and the method to be pursued in the revision.

At the election of officers, Frank Short, electrical engineer, California Industrial Accident Commission, Los Angeles, was named president; E. M. McLaughlin, city electrical inspector, Richmond, first vice-president; Arthur C. Veit, city electrical inspector, Alhambra, second vice-president; and C. W. Mitchell, secretary-treasurer. To the executive committee were elected R. W. Wiley, past president; H. N. Beecher, chief inspector, Los Angeles, active member-at- large; H. C. Rice, Southern California Edison Co. Ltd., associate member, Class A; J. O. Dillingham, General Electric Co., associate member, Class B. Representative on the I.A.E.I. executive council, R. H. Manahan.

The nominating committee was made up of C. E. Hardy, Oakland; H. B. Wells, Los Angeles; and H. V. Dobson, Santa Barbara. Santa Barbara was selected as the next convention city by a committee consisting of A. C. Veit, Wm. McFadden and E. H. Snedaker. The committee on resolutions consisted of George E. Kimball, Edward M. McLaughlin and H. C. Rice.

George I. Drennan, left, field engineer, Pacific Power and Light Co., and Harry Sroufe, of Jaggar-Sroufe, Portland contractors, were both named to the Executive Board of the Northwestern Section, I.A.E.I. The latter was one of the founders of the organization in 1926

Adequacy Receives Attention at Northwest Inspectors Meeting

INSPECTORS and contractors from the Northwest states heard interesting portrayals of major code problems and discussed committee reports recommending changes in the National Electrical Code at the sixth annual convention of the Northwestern Section, International Assn. of Electrical Inspectors, at Salem, Ore., Oct. 5-7, 1931. No one topic dominated the discussions, but the broad subject of adequacy, which cropped up in various committee reports, and which received particular attention in talks by Arthur L. Abbott, N.E.M.A., New York, and Victor W. Hartley, Pacific Coast Electrical Bureau, San Francisco, might be said to have sought more attention than any other one subject.

Mr. Abbott's analysis of the new A.E.I. standards for adequate house wiring was similar to his talk before the Southwestern Section meeting and is reported at greater length under the account of that meeting. After considerable discussion of the various points raised by this paper, it was decided to appoint a committee to work with Mr. Abbott in setting up adequate standards that might be accepted in this territory.

The use of the Red Seal plan of selling adequate wiring in the home, as operated in California through the P.C.E.B., was explained by Mr. Hartley during the last session of the meeting, to which had been invited members of the Portland Electric Club and the Portland Association of Electragists. Mr. Hartley made it plain that no materials or methods were specified under the Red Seal plan, but that it embodied simply a standard of adequate wiring which would permit a full use of electricity for present-day accepted applications in the home. Through charts developed in a survey of the situation in California after the Red Seal plan had been in operation for some years, it was shown that the plan had been responsible for increasing the size of the average wiring job and had been influential in paving the way for the sale of current-consuming devices.

Two important contributions to the program were made by Victor H. Tousley, electrical field engineer, N.F.P.A., Chicago: first when he addressed the combined luncheon with the Salem Chamber of Commerce and the convention delegates, bringing out the value to the community of the local inspector backed by inspectors' associations and by the National Electrical Code; and second, when he discussed before a session of the convention the major changes in the 1931 edition of the N.E.C. In connection with the latter, he indicated the importance of inspectors' associations by pointing out a number of cases in which recommendations of the Northwestern Section had been written into the new code.

A history of man's efforts to raise weight from lower to higher elevations, from earliest antiquity to the last word in electric elevator installations as exemplified in the Empire State Bldg., was an entertaining and instructive part of the program contributed by L. W. Whitton, construction manager, Otis Elevator Co., San Francisco. Drawings and photographs reproduced in slides served to illustrate this evolution.

A major educational feature of the program was the exhibition by the following companies, displaying the latest designs in devices and materials they manufacture: Steel & Tubes, Inc., Cleveland; Trumbull Electric Co., Seattle; Coast Specialty Co., Portland; Fouch Electric Mfg. Co., Portland; Westinghouse Electric & Mfg. Co., Seattle; Gamewell Fire Alarm Co., San Francisco; Electrotrim, Chicago; and I-T-E Circuit Breaker Co., Seattle. Portland General Electric Co. also displayed samples of some of the modern hot-bed heating installations being installed in its territory.

Another educational feature was the inspection trip to the plants of the Miles Linen Mills and Salem Linen Mills, Inc., and a visit to the state penitentiary which was thrown open for the inspection of the delegates.

Diversion was offered by the annual golf tournament and for the first time since the commencement of this activity the Inspectors' Cup was won by an inspector, L. W. Going, of Portland. The convention closed with a banquet Wednesday night during which the jovial spirit of the toastmaster, A. C. McMicken, Portland General Electric Co., Portland, prevailed to keep the talks in lighter vein and to focus interest on a number of excellent entertainment numbers, furnished largely by local organizations.

A resumé of the committee reports and discussion, and other action of the business sessions, follows:

The convention was welcomed by Hon. P. M. Gregory, mayor of Salem, and W. M. Hamilton, division manager, Portland General Electric Co., of that city. The reports of the president, C. E. Foster, electrical inspector, Astoria, Ore., and the secretary, F. D. Weber, Oregon Insurance Rating Bureau, Portland, indicated that the Northwestern Section was in a generally healthy condition as to membership and finances. During the past year six supporting memberships had been taken by various utility companies in the territory.

Though a number of recommendations for changes in the national code were offered in the reports of the various committees, no definite action recommending revision was taken inasmuch as no revision of the code is contemplated by the Electrical Committee until the 1933 meeting, before which another convention of the Northwestern Section will be held, thus permitting a full year's study of the suggestions made at this year's meeting.

ARTICLE COMMITTEES

Services and Service Equipment—Among suggestions for improvement of Article IV, as offered by the committee chairman, S.

B. Clark, Northwestern Electric Co., Portland, was the suggestion that rules controlling service switches and fuses be clarified to conform more closely to practical operating methods, with the particular object of omitting the larger amperage service switches and dividing the circuit into units of comparatively small capacities with proper safeguards on these units. Discussion brought out that this would tend to do away with the "tangle box" and possibly the switch board in favor of the industrial panel.

Wiring Methods—Article V Committee as reported by J. A. Casey, electrical inspector, Walla Walla, Wash., made suggestions looking toward the relief of overcrowding of outlet boxes used in connection with conduit, armored cable, and other types of wiring. The report also suggested that rigid conduit be shipped in 10-ft. lengths and expressed the opinion that by using threadless pipe and fittings, a saving in the cost of wiring could be effected.

Box and Cabinet Outlet, Etc.—The overcrowding of outlet boxes also received the attention of Article VII Committee, which reported certain attempts to cover this by local rules in different parts of the country. The committee concluded that a definite rule should be developed for inclusion in the National Code, allotting a certain number of cubic inches for different sized wire and for switches or receptacles mounted in the box. As the basis on which to make a more definite recommendation next year, it was suggested that No. 12 and smaller wire be allotted 2 cu.in., with larger wires allotted proportionately more space, with 6 cu.in. provided for each switch or receptacle.

Conductors—A discussion of demand calculation for feeder sizes by the Article VI Committee, F. H. Murphy, chairman, precipitated a resumption of the old discussion on how far adequacy could be written into the Code and to what extent it should be sold rather than legislated. In this discussion William S. Boyd, secretary, Western Section, Chicago, suggested that the inspectors do some of the selling by informing the public just what they get with a certificate of inspection.

Automatic Overload Protection—The fact that there are available a number of dependable and inexpensive overload protective devices for small motors led the Article VIII Committee, as reported by L. R. Elder, General Electric Co., Portland, to the conclusion that the code should require overload protective devices on manually started motors of ¾ hp. and 1 hp. capacity, in addition to present requirements on larger motors. The committee's opinion also favored overload protection on all automatically controlled motors of 1/30th hp. capacity and above.

Grounding—Among recommendations for changes in grounding rules by the Article IX Committee, that pertaining to grounding an interior wiring system to a water piping system, with the grounding conductor in conduit and the point of connection to the water system outside the building, developed the largest amount of discussion on an always much discussed subject. Several speakers brought out the necessity of considering the interest of the water companies and waterworks' departments in making rules on grounding. Utility company opinions expressed indicated that many of the companies have found it desirable not to attempt to rely on other than continuous underground metallic water piping systems for their grounds, and where such a system is not available, have adopted a practice of creating their own grounds using a solid secondary neutral grid. E. B. Morrison, of the Oregon Insurance Rating Bureau, Portland, chairman of the committee, defended some attacks on portions of the committee's recommendation and secured general approval for the report.

Switches, Switchboards, Fixtures, Etc.—This committee, headed by E. G. S. Pryor, Underwriters' Laboratory, Seattle, made minor suggestions on Articles XII and XIII but held in abeyance any recommendation on Article XIV until after reviewing the 1931 edition of the code. One thousand amperes was suggested as the maximum allowable current that may be broken by any open knife switch operating at a potential between 300 and 600 volts, and 3,000 amp. for similar switches operating from 125 to 300 volts.

Electrical Appliances and Resistance Devices—A rule to combine under one heading the specifications and classifications for branch lighting and/or appliance circuits was presented by A. M. McLean, deputy electrical inspector, Portland, chairman of the Articles XVI and XVII Committee. This rule, entitled "Article XX, Requirements for Lighting and Appliance Branch Circuits," was acknowledged as the work of L. W. Going, chief electrical inspector, Portland, having been brought about by the confusion created by inconsistencies appearing in Article XVI and VIII of the present code. In the interests of interpreting the meaning of the code and clarifying this meaning in a comprehensive and consistent manner, Mr. Going, who is a member of the Article XVI Committee of the Electrical Committee, had suggested this revision for consideration at the next Electrical Committee meeting. The proposed new article makes a distinction between portable and fixed appliances.

Mr. McLean's report also brought to the attention of the convention the comparatively new application of electrical energy for heating soil for plant growth, giving a brief description of some of the methods that have been developed for heating hotbeds and greenhouse soil in the Portland area.

Cranes, Hoists and Elevators—Hazardous Locations—Steel tubes appeared briefly twice, in two committee reports, without definite recommendations this year. J. F. Julian, electrical inspector, Wenatchee, Wash., chairman of Article XXX and XXXI Committee, and N. J. Sankeia, Pacific Millers Insurance Co., Seattle, chairman of Article XXXII Committee, both gave consideration to the extention of permission to use metallic tubing in the locations covered by their committees. Definite recommendations on these points are to be brought forward next year.

Radio Equipment—I B. Sturges, deputy electrical inspector, Portland, chairman of Article XXXVII Committee, reported that the recommendation offered by his committee last year for eliminating hazards in the operation of power operated radio equipment had not yet been definitely acted upon by the Electrical Committee and that there were no new recommendations of the local committee for this year. The report called attention to the fact that enforcement in Portland of that portion of the Portland ordinance requiring approval of appliances sold in the city had resulted in a large number of power operated receiving sets being submitted to and listed by the Underwriters' Laboratories.

Signal Systems—Pointing out a number of faults in the present rules under Article LX, J. F. Gray, deputy electrical inspector of Portland, chairman of this committee, recommended that the article be made to cover in more detail the various kinds of signaling systems, taking into account the need for the large supply of energy required to operate them, and covering also the approval in their entirety of all systems from the source of supply to the control and consuming devices.

Electrical Fires and Accidents—No report of the local committee on this subject was offered, but time was taken to discuss the report of the national committee which offered a standard classification of fires of electrical origin and a standard form for reporting such fires. This report was turned over to the local committee for more complete study before definite recommendation next year.

Other Standing Committees

Inspection Forms and Procedure—A. M. McLean, chairman of this committee, reported that the committee is waiting to receive the standard forms in process of preparation by the international committee for review before making definite recommendations.

Legislative Committee—The status of proposals in Oregon and Washington looking toward the establishment of state codes was reported by F. H. Murphy, Portland General Electric Co., chairman of the legislative committee. The importance of educating legislators and the general public in the potential hazards of improper installation and of the desirability of rules for preventing unsafe wiring was stressed.

Uniform Electrical Ordinance—A form of uniform ordinance was suggested by the committee, as reported by F. C. Lyman, deputy electrical inspector, Portland, chairman. Discussion on this report by W. J. Canada, N.E.M.A., New York, stressed the apparent necessity for control by law of the number and quality of manufactured articles used in wiring so as to protect the public safety and at the same time protect the public pocket-book from having to assume the burden of the cost involved in inferior articles and in too many items of similar character. The economic effect of the more or less universal adoption of such legislation on the existing evils of overproduction in the electrical manufacturing field was stressed.

Code Clearing House—The report of this committee by L. W. Going, chairman, summarized the recommendations made by the Northwest Section in recent years and showed the action taken by the Electrical Committee in each case. The report indicated that out of 44 proposed amendments to the National Electrical Code, 24 amendments had been adopted by the Electrical Committee and now formed a part of the Code.

Special Committees

The report of the special committee authorized at last year's convention with H. S. Jenkins, electrical inspector, Bellingham, Wash., as chairman, to recommend rules for temporary wiring in fairs and exhibitions was presented by H. A. Patton, electrical engineer, Washington Surveying and Rating Bureau, Seattle. The suggested rules covered motors, switches, wires, meters, transformers, lighting circuits, portables, grounding and miscellaneous devices. In discussion, certain amendments to the rules were suggested and the report was passed with the recommendation that the establishment of uniform rules be made the subject of national study.

In a report of another special committee giving reasons for and against the adoption of No. 12 B&S gage wire as the minimum standard for house wiring, the conclusion was reached that this minimum should be established, and that Article VI of the Code should be amended accordingly. The reasons for increasing the minimum were discussed under (1) increased safe capacity of circuits, (2) improved voltage regulation; while the objections to increasing the minimum were chiefly (1) opposition to increased cost, (2) difficulties with standard wiring devices. The report was presented by W. R. Grasle, E. L. Knight Electric Co., Portland, chairman.

Elections

On the last afternoon the following officers were elected for the coming year: president, J. A. Casey, Walla Walla; first vice-president, A. M. McLean, Portland; second vice-president, J. F. Julian, Wenatchee; secretary, F. D. Weber, Portland. Members of the executive board elected were: W. H. Brust, Portland; E. G. S. Pryor, Seattle; G. I. Drennan, Walla Walla; B. R. Stair, Seattle; George Boring, Portland; J. H. Sroufe, Portland. F. D. Weber was elected as the section's representative on the executive council.

There was no contest on the choice of the place of next year's convention, the invitation of Wenatchee, Wash., being unanimously accepted. Tentative dates for the meeting were set as Sept. 6-8, 1932.

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Name First All-G.E. Franchise Dealer on Coast

John Lowe Walker, Inc., carrying the entire General Electric line of home appliances and radio, was formally opened for business recently at 4538 University Way, Seattle. The store is the first of its type in the Northwest, Mr. Walker explaining that it is the first Pacific Coast store of a series of independently owned units established to retail and service General Electric products.

Mr. Walker, president of the organization, has been connected with radio and its allied lines for many years and is well known in Northwest electrical circles.

Manufacturer Distributor

Manufacturers Unite in Sunlight Campaign

Capitalizing on the development of the S-2 Mazda sunlight lamp, eighteen leading fixture manufacturers have joined in a cooperative advertising program featuring popular-priced equipment for use of this lamp. Each of the participants of the program will contribute to the cost of its operation in proportion to the volume of his business in ultra-violet.

Equipment of all manufacturers cooperating is submitted to the Mazda laboratories for test. When approved, a tag is made available to the manufacturer which signifies that his product has been tested and approved by the Mazda sunlight lamp manufacturers. This tag will be featured in the advertising.

In addition to trade-paper advertising, during the next few months advertisements will appear in the leading general magazines and in a number of medical journals. Inquiries from a dealer's particular territory regarding Type S-1 or S-2 lamp fixtures handled by him will be forwarded to him through the manufacturer.

The following manufacturers are participants in the campaign:

Beardslee Chandelier Mfg. Co., Chicago; Benjamin Electric Mfg. Co., Des Plaines, Ill.; Brady Mfg. Co., Detroit; Curtis Lighting Inc., Chicago; Dominion Electrical Mfg. Co., Minneapolis; The Frink Corp., Long Island City, N. Y.; General Electric Co., Bridgeport, Conn.; The Edwin F. Guth Co., St. Louis; Helthmaster Sun Ray Lamp Co., Indianapolis; Holophane Co., Inc., New York; The Kayline Co., Cleveland; Lightolier Co., New York; Luminator, Inc., Chicago; The Miller Co., Meriden, Conn.; Moe-Bridges Co., Milwaukee, Wis.; S. Robert Schwartz & Bro., New York; The F. W. Wakefield Brass Co., Vermillion, Ohio; Westinhouse Electric & Mfg. Co., Cleveland.

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COUCH BUYS BLAKE SIGNAL CO.—The business and good will of the Blake Signal & Mfg. Co., of Boston, have been acquired by S. H. Couch Co., Inc., North Quincy, Mass., producer of telephone apparatus for private installations. The manufacture of Blake insulated staples is being continued at North Quincy, and the Blake name will be preserved. Blake sales representatives will remain as Couch sales representatives for the Blake line. The Sierra Equipment Corp., of San Francisco, Los Angeles and Seattle, will continue as Pacific Coast agents for the Couch company's telephone apparatus and Kieler-White Co., of Los Angeles, will distribute Blake insulated staples in this territory.

Anchor Manufacturers Merge Lines

The uniting of two anchor manufacturers has been effected by the acquisition last month by the James R. Kearney Corp., of St. Louis, of the Chance Co., of Centralia, Mo. The combining of the resources and production facilities of the two companies makes it possible for the Kearney Corp. now to supply every type of anchor made for construction requirements in the electrical industry.

Kearney anchors include the 4-in-1 expansion anchor, steel rod screw anchor, pipe rod screw anchor and "No-Rench" screw anchor. The Chance line embraces 2- and 4-way expansion anchors, pyramid "Cone" anchors, "Never-Creep" plate anchors and steel screw anchors.

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METER DEVICES CO., Canton, Ohio, manufacturer of meter testing devices, has announced the appointment of J. G. Corrin, 140 North Sycamore Ave., Los Angeles, as sales representative for its products in the state of California. Mr. Corrin was at one time Pacific Coast manager for the Pittsburgh Transformer Co., and for three years served as special representative of the Allis Chalmers Mfg. Co. in this territory. Wagner Peterson Corp., 535 Clifton St., Portland, has been appointed to represent the Meter Devices Co. in the states of Washington and Oregon.

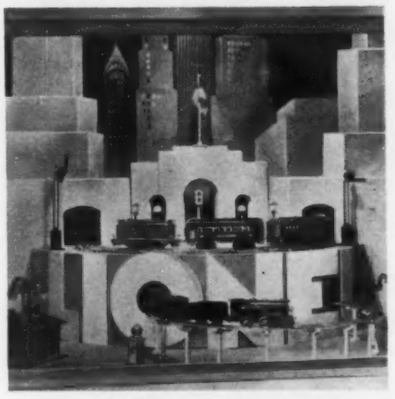
C. H. ESSEX, who has been active in engineering and sales work for the Automatic Electric Co., Chicago, for more than twenty years, has been transferred to the Pacific Coast and is now attached to the Sierra Equipment Corp. as manager of its Automatic Division. He will have headquarters in the Los Angeles office, but will also spend considerable time in San Francisco and Seattle.

HOWARD M. SAUL, Los Angeles, has been appointed representative of the Readrite Meter Works, Bluffton, Ohio, in Pacific Coast territory. Mr. Saul recently moved his office to 487 Chamber of Commerce Bldg.

SIERRA EQUIPMENT CORP., Los Angeles, San Francisco and Seattle, has been appointed exclusive Western distributor of the complete line of Ajax electrical specialties and Ajax radio and antenna equipment manufactured by the Ajax Electric Specialty Co., Chicago.

CLAUDE A. PEARSON has joined the sales staff of the General Electric Supply Corp. as a washing machine specialist in the San Francisco territory. Mr. Pearson was formerly with the company in Oakland, but left in the summer of 1930 to join The Armstrong Appliance Corp., of Huntington, W. Va., as a resident salesman in San Francisco.

Dealer Helps for The Retailer

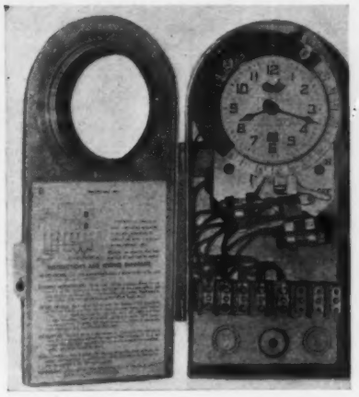


Entirely original are the colorful window and store displays offered to dealers by The Lionel Corp., 15 East 26th St., New York, this year. The displays are constructed of wood and are completely wired. Trains run around, in and out of tunnels, with signals operating and station lights turned on. Cost of the displays runs from $50 to $200

For displaying its "Winner" electric trains, The Lionel Corp. offers this lithographed store and window display standing 27 in. high, 28 in. wide

Frigidaire Corp., Detroit, is solving the problem of interesting prospects in refrigeration during the winter months by equipping salesmen with this demonstration case

New Products



Time Switch Has Self-Starting Motor Movement

A time switch with self-starting synchronous motor movement made by the Waltham Watch Company has been announced by the Triplex Products Corporation, Clifton, N. J. No winding is necessary, thus obviating periodic trips to the time switch. Accurate electric time is visible at a glance through a glass window in the door of a cadmium-plated steel housing. These switches may also be obtained in weatherproof housings. The housing may be padlocked or sealed and is furnished with knockouts at sides, bottom and back.

The switch unit comprises a "Mercoid" snap-action switch mechanism and "Mercoid" mercury tubes, operated by easily set "on" and "off" control clamp cams. The time switch may be obtained in 20, 40, 60 or 80-amp. capacities at 110/220 volts, with the synchronous motor arranged for 110 volts, 60 cycles. Clock motors for 220 volts or for 50 cycles may be supplied.

Normally the switch is supplied with one "on" and "off" control clamp cam. If desired, additional sets of clamp cams may be furnished. The minimum operating time cycle of the switch is 30 minutes.—ELECTRICAL WEST, Nov. 1, 1931.

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Program Light

A small "program light" for installation in the backs of theater seats has been developed by Kliegl Bros., of New York. Individual batteries are used for the lamps, which are fitted into the backs of the chairs with no projections of any kind to catch the clothes or bother patrons passing in and out of seats. A guard shields the light so that it illuminates only the program held directly below it.—ELECTRICAL WEST, Nov. 1, 1931.

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Liquid Protective Coating

Liquilox, a liquid protective coating for industrial uses, has just been placed on the market by Liquilox Co., Ltd., 576 Subway Terminal Bldg., Los Angeles. Containing no dyes, lamp black, rosin, asphalt, gilsonite, vegetable or animal oils, Liquilox, according to the manufacturer, offers maximum, and often absolute protection against acids, alkalies, salts, and indirect heats from 1,500 to 2,500 deg. F.

Liquilox protective coating can be applied cold, and with either spray gun or brush. It works equally well on either hot or cold surfaces and need not even be dry before being submerged in water. The manufacturers state that, as far as they have been able to determine, Liquilox termite-proofs all surfaces and materials subject to this pest, and that tests conducted with the electric arc have proved it to be a non-conductor of electricity.—ELETRICAL WEST, Nov. 1, 1931.

Door Chimes

A smaller sized model of its Velvatone door chimes has been brought out by the Electric Signal Co., Ltd., of Los Angeles, to sell for $24.50. This New Flanders model has two notes, C and G, and its entire mechanism is concealed behind a removable ornamental shield at the top of the chimes. While entirely adequate for the finest homes, the New Flanders chimes are especially adaptable for small homes and bungalows, and for the professional offices of doctors, dentists, architects, lawyers, etc. The longer of the two chimes measures 45 in.—ELECTRICAL WEST, Nov. 1, 1931.

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Cleaning Compounds

A new line of industrial cleaning compounds is announced by Cee-Bee Laboratories, Ltd., 655 E. Gage Ave., Los Angeles. Containing no acidic or other harmful ingredients, Cee-Bee compounds are strictly physical agents and do not combine wih oil, grease or any foreign matter. They may be applied by hand, by emersion, by pressure gun or through circulation, and, the manufacturer points out, they clean by a new process of defloculation of solids and the emusification of liquids.—ELECTRICAL WEST, Nov. 1, 1931.

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"Gift Model" Extractor

For holiday selling, the California Fruit Growers Exchange, Chicago, has announced a new gift model Sunkist Jr. electric juice extractor. The body is finished in lustrous black, the bowl is of jade green glass, and the extracting bulb of ivory beetleware. Retail price, $13.75. Price of the regular Sunkist Jr. with the gray-blue finish and white bowl has been reduced from $14.95 to $11.95.—ELECTRICAL WEST, Nov. 1, 1931.

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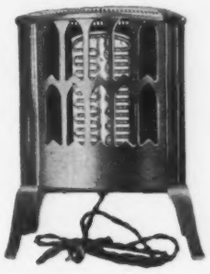
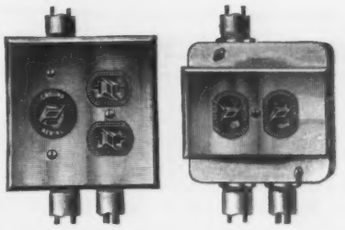
Apex Electric Heater

A new style portable room heater, the P-12C, has just been announced by the Apex Mfg. Co., Emeryville, Calif., to retail at $10. The new heater is of the radiant convection type, rated at 1,250 watts, 110 volts, and is chromium finished throughout. Model P-15C, a 1,500-watt heater of a similar type is priced to retail at $12.50. Distributed in the West by Sandoval Sales Co., San Francisco, and Apex Sales Co., Los Angeles—ELECTRICAL WEST, Nov. 1, 1931.





Wired-in Antenna System

Hart & Hegeman Division of the Arrow-Hart & Hegeman Electric Co., Hartford, Conn., announces the "H&H" multi-coupler antenna system of radio wave distribution in three types, No. 3060, 3063 and 3066, shown above.

No. 3060 has one outlet for plugging in the aerial connection, one for power and one for a portable lamp, similar in appearance to standard convenience outlets with wall plates to match. No. 3063 is a one-gang unit giving radio connection for aerial and ground, also one power outlet. The unit is complete with box, divider plate cover, receptacle and cap, multi-coupler and plate. No. 3066 is a one-gang unit consisting of a radio outlet, cap, multi-coupler and plate used for aerial and ground connection.—ELECTRICAL WEST, Nov .1, 1931.

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Everhot Water Heaters

A feature of the new model "F" water heater manufactured by the Everhot Electric & Mfg. Co., Los Angeles, is a new type thermostat which is full automatic when a continuous supply of hot water is desired, or, by the operation of a small lever, is made semi-automatic if water is to be heated only when required. A convenient temperature adjustment is provided when used for either type of control. New low prices now apply to all models of Everhot water heaters.—ELECTRICAL WEST, Nov. 1, 1931.

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Sunbeam Smokemaster

Chicago Flexible Shaft Co., Chicago, has added the Smokemaster to its line of Sunbeam appliances. This unique device not only selects and serves cigarettes automatically, but each cigarette is lighted when it is taken from the cabinet and is all ready to smoke. In modern design, finished in lustrous black bakelite combined with chrome plate, conventionally engraved, the Smokemaster retails for $6.50. Height 4 in., length 7½ in., width 5½ in.—ELECTRICAL WEST, Nov. 1, 1931.

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Electric Clocks

A new line of synchronous electric clocks designed and manufactured for national as well as local distribution is announced by Stanford Products, Ltd., 1663 Mission St., San Francisco. Twenty-five models are in production, including alarm, calendar and chime clocks, to retail from $5.95 to $36.95. All alarm clocks are 24-hour automatic and calendars 4-year automatic.—ELECTRICAL WEST, Nov. 1, 1931.

Barometer

INDUSTRIAL activity in the Western states, as measured by consumption of electrical energy in industrial establishments, fell off 6 per cent in September compared with August but remained well above July's level. The general average continues decidedly lower than in several preceding years: Down 21 per cent from 1930, and 28 per cent from 1928 and 1929. The average for the first nine months of the year is down 12.5 per cent.

The food industry, after rather unusual activity in August is down again, but only relatively; the index is almost the same as that of August, 1930, and the average for the first nine months is 5.6 per cent higher than last year. It is noteworthy that this group is doing well and has been doing well all over the country; it had its peak year in 1930, nationally considered, when almost every other industry was suffering severe curtailment, and the figures for 1931 are running close to those for 1930.

By contrast, the metals group continues at the extraordinarily low level of other recent months; its activity is only 48 per cent as great as in September, 1930, and 29 per cent as great as it was two years ago. Here again Western industry is running essentially parallel with that in other sections. Commodities like food and clothing are doing fairly well, but those used in building the equipment necessary for production—specifically the metal industries—are extremely inactive.

Indexes of Industrial Activity in the Western States

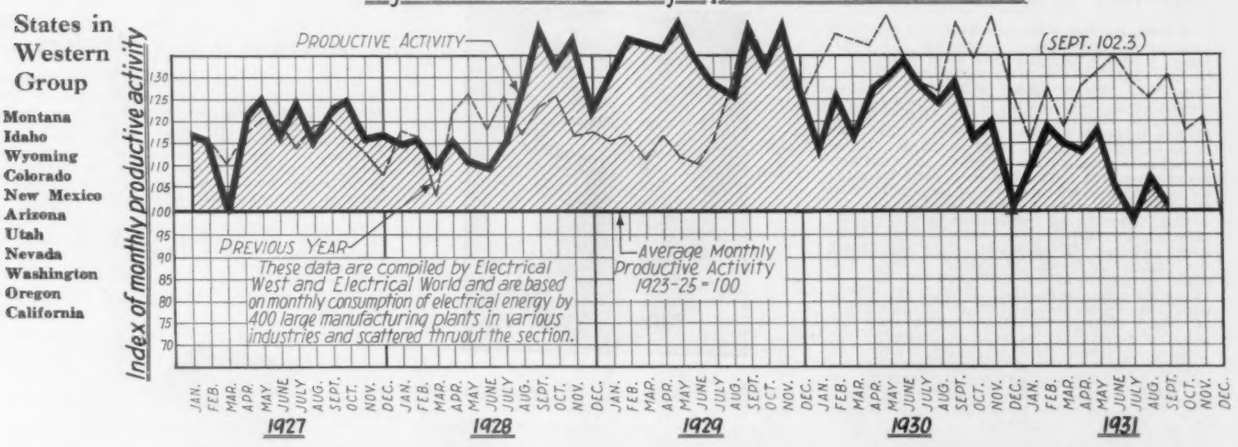
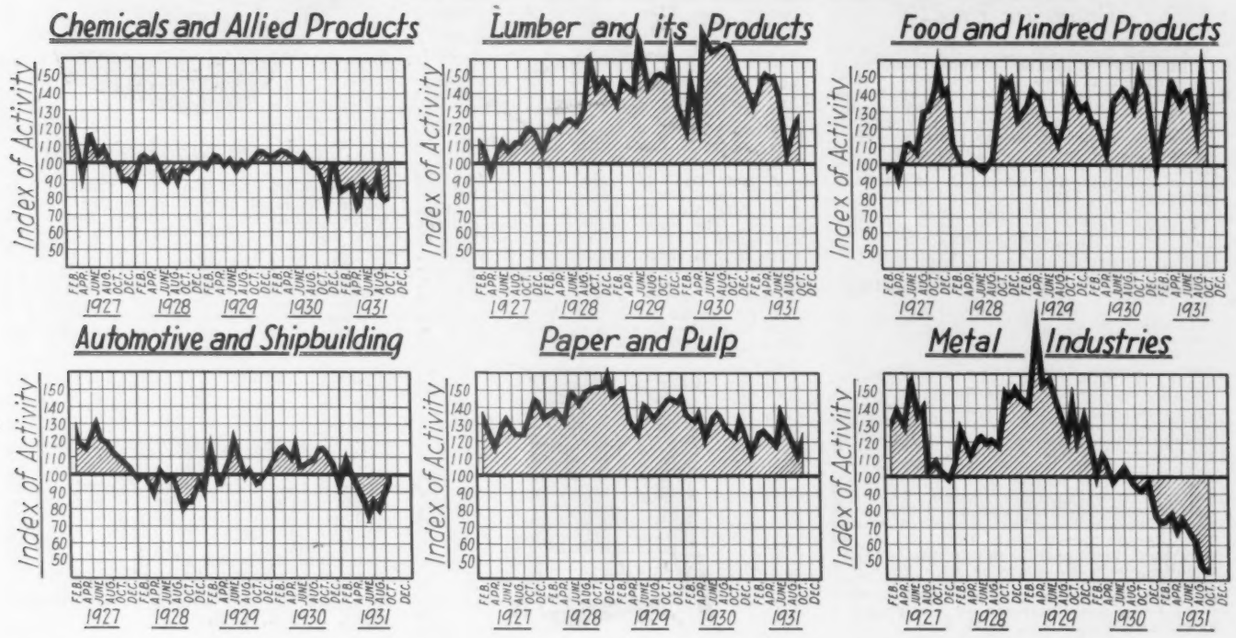
(All figures adjusted for number of working days.)

	September 1931	August 1931	July 1931	Sept. 1930	Average for 9 mos. 1931	Average for 9 mos. 1930
All industry	102.3	108.8*	96.8	130.9	110.5	126.5
Chemical and allied products	78.1	77.1*	87.8	86.0	80.7	102.5
Food and kindred products	134.5	165.0	125.5	156.5	141.9	134.2
Forest products	129.0	125.4	110.4	168.0	138.1	158.1
Metals group	43.4	43.8	47.8	90.3	60.8	99.9
Paper and pulp	126.3	115.5	124.2	122.7	126.9	131.6
Rubber	115.1	103.1	146.0	127.0	141.9	159.6
Shipbuilding	96.2	85.2	77.8	116.8	89.4	113.9
Stone, clay and glass	93.9	96.5	82.8	113.1	92.5	102.5

*Revision

General Productive Activity in the Western States

Adjusted for number of working days but not for seasonal variation



Productive Activity in the Primary Industries of the Western States